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INFECTIONS OF THE SEMINAL DUCTS*

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This is a physical therapy program and possibly this presentation is given to you as a diversion from the continuous talk on physical therapy. This discussion will be illustrated by a number of slides representing both clinical and experimental work done on human and animal, living and dead.

Within the last thirty years or more, since the advent of the cystoscope, many advances have been made in the knowledge of the disease of the kidney and bladder, many advances have been made in the treatment of disease of the kidney and bladder, but during all this period of the change that took place in urology, the genital tract has been almost entirely overlooked; there has been very little done, very little explained about the pathology or the anatomy or the physiology of the genital tract in the male. So that this particular talk will cover some phases of andrology, which means the study of the genital tract of the male.

This particular slide represents, as you see, the seminal vesicle. You can see the vas as it turns in here. This particular slide was made by injecting through the vas in the scrotum, by lifting the vas out of the scrotum and injecting the vas toward the posterior urethra toward the bladder, upward, with the contrast solution consisting of one of the iodized oils. We used either lipiodol or iodipin, the usual preparation that has been recommended for radiography, 40 per cent strength.

Fig. 1.—Normal vasa and vesicles filled with iodized oil through vasotomy; the vesicle fills before the fluid passes out through the ejaculatory duct; this we have observed through the fluoroscope also. Hence the vesicle must be considered a reservoir for spermatozoa.

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*Cuts courtesy Journal American Medical Association and Journal of Urology.

There are a few interesting points that are brought up right here. You will note that everything injected from the vas fills up this vesicle and nothing overflows into the bladder, indicating that this vesicle is a true reservoir for semen. A good many pathologists and physiologists believe that the seminal vesicles merely give off secretion. They are actual reservoirs for the semen.

The seminal vesicle, as you see, is quite a large sized structure; it isn't anything like the Cowper's glands. Strange to note, it seems that in the consideration of the pathology of complications of gonorrhea the seminal vesicles are overlooked. We speak of the prostate all the time, and when you think of epididymitis you never consider there may be such a thing as infection of the seminal vesicles also. In about 80 per cent of acute gonorrhea the posterior urethra is involved, about 40 per cent prostate and about 20 per cent the seminal vesicles. You can see it is impossible to develop an epididymitis without having a vesiculitis.

This is another slide also showing the seminal vesicle injected in the very same manner. This is the overflow into the bladder and this is a safety pin on the man. These were made on the living human and were done for experimental purposes. It shows that we have anomalies of the seminal tract just as you do of the urinary tract. In other words, you have diverticula, peculiar implantations or absences or multiplicity of these various structures.

You see how that vas is turned here. There is some reason for this kinking and twisting. In the embryonic state the testicle and kidney are pelvic organs. The kidney moves up and the testicle moves down, and as the testicle moves forward, it carries its vas along with it, the vas following in front of the ureter, then as it passes along, past the external hypogastric artery, it forms a kink here. You know very well that the testicle moves up and down, depending upon cold and heat, and depending upon other conditions. This particular redundancy of the vas allows for this moving upward and downward of the testicle. These are beautiful pictures of seminal vesicles showing that these structures are actually large enough when you see them postmortem to appear almost as big as the prostate.

Some years ago we conducted a series of experiments on the vas. Here is the epididymis and here is the vas deferens. These experiments were made on dogs. It is a well-known fact that all epithelial lined ducts have unusual regenerative capacity. In other words, if you resect three-fourths of the bladder, the bladder will regenerate. In doing a prostatectomy you tear out some of the posterior urethra and it regenerates. You cannot tie off the common bile duct or the fallopian tubes. In order to determine the regenerative capacity of the vas, we cut it in two or we cut out a piece or we cut it and sewed it together again and then after allowing the animals to live for a period varying from eight to thirty or forty days, they were then destroyed and the entire seminal duct together with the testicle was removed and then rayed by the injection of the contrast fluid from the upper end, to determine whether or not the place where the section had been made or where the vas had been tied was patent again. In this particular case the vas had been tied with catgut and the animal was destroyed eight or nine days later. You can readily see here is a complete regeneration.

This particular regenerative capacity of the vas is of importance in doing sterility work. In sterilizing the insane we learned long ago that tying off the vas was often of no value. One had to either cauterize it, or in order to make sure that no restoration of lumen occurred, take this end and this end and oppose them laterally.

In this particular case a part of the vas had been resected possibly half an inch. I don't

recall the details. You can readily see that following injection complete regeneration occurred because the fluid went right through.

Here is a piece of the vas in which about three-quarters of an inch of that vas had been resected and there is complete regeneration.

Here particularly regeneration is aided by the fact that the vas has a sheath which acts as a splint just as does periosteum of bone, or the sheath of a tendon; and it also has a blood vessel along the posterior surface that also acts as a splint.

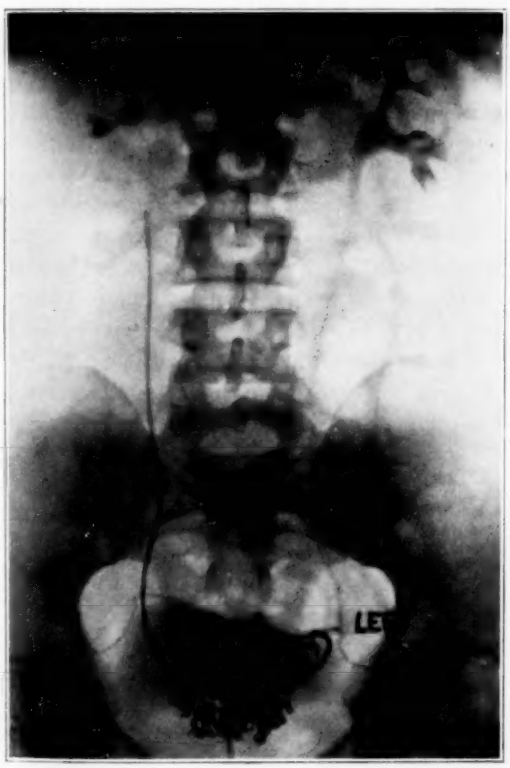

Fig. 2.—Relation of vasa and vesicles (filled with iodized oil) to ureters; catheter in right ureter; sodium iodide, 15 per cent, in left ureter and pelvis.

This is an interesting slide. I don't know that any others have ever been shown. This is a combined urogram, vesiculogram and vasogram. In other words, in this particular case we injected the seminal vesicles here and then cystoscoped the individual and inserted catheters up the ureter and injected some contrast fluid to make a pyelogram. On this side I attempted to inject some iodized oil. It runs very poorly; it is injected with great difficulty, and I didn't do it.

Here is a picture showing you the relation of the vas to the ureter, the relation of the ureter to the seminal vesicle. You can readily see that some of the symptoms of the seminal vesiculitis which are not very common are, however, not far-fetched when we speak of ureteral stricture in association with seminal vesiculitis or possibly acute urinary retention due to pressure on the ureter.

Certain infections attack the testicle and others attack the epididymis. Hematogenous infections tend to strike the testicle rather than the epididymis and infections extending from the posterior urethra strike the epididymis rather than the testicle. This is merely to bring out the blood supply of the testicle. This is the testicle of a bull, showing the veins and also showing the veins in the mediastinum of the testicle.

It is interesting to note that two very common diseases of the genitalia do not involve the testicle. There is no such thing as gonorrheal orchitis. It is gonorrheal epididymitis, and we see tuberculosis of the testicle only following a tuberculous epididymitis. That may be explained possibly by the fact that during the ages gonorrhea and tuberculosis have been with us, the testicle being a very vital structure, has developed some sort of immunity toward it; mumps involves the testicle very commonly; in fact, it is anywhere from one in eight or one in three and usually followed by atrophy.

This gives a semigrammatic sketch of the epididymis and the vas. As you know, the testicle

has seminiferous tubules which produce the sperm, the epithelium of the tubules going through various stages to develop spermatozoa.

In the lower vertebrates living in water and in many invertebrates the same condition or the same relation exists as that between the ovary and the fallopian tubes. In other words, the testis emits its semen into the peritoneal cavity, and it is then expelled through pores in lower abdomen and into the water, but in the higher animals we have this continuous form of duct.

These are the vasa efferentia, about a dozen to 15 in number, which form coni vasculosi at the head of the epididymis. You can see this epididymis. It is about 20 feet in length, straightened out. The continuous coil is banded together into compartments by fibrous tissue and you can see these coils are directed toward the outlet duct until it reaches the bottom. This is the vas deferens, a development from the wolffian duct, and this is the beginning of the vas.

This is a roentgenogram of a postmortem specimen of the human testicle epididymis and vas. The interesting point about this is in attempting to make a radiogram of the epididymis, irrespective of the degree of pressure exerted or the length of time the pressure was applied, whether the pressure be high or low or intermediate, nothing could be injected beyond the tail of the epididymis; and that is of considerable clinical importance.

I have separated the epididymis from the testicle except at its head. The vas was injected. This is also a human, postmortem. It was found that no fluid could be injected beyond the tail of the epididymis. In other words, irrespective of the degree of pressure exerted, no matter whether you left it for days with gravity, you couldn't get beyond the tail with the contrast fluid.

Here is a testicle of a ram, and the same condition exists. The ram has quite a large epididymis; so has the bull. Here the vas was injected. You can just see the tail of the epididymis, nothing beyond that.

These are testicles of dogs. Here the same condition occurs. The vas was injected, and you can see the tail of the epididymis showing up beautifully, and there is the head of the epididymis, and the body, nothing injected beyond the tail.

That explains a good deal possibly of the mechanism of epididymitis and the pathology within the epididymis itself. Normally the vas undergoes peristalsis and the spermatozoa that are in it constantly propel forward until they fill up the seminal vesicle. In the development of gonorrhea you know that as a result of extension of infection from the anterior to the posterior urethra, the posterior urethra becomes involved, the prostate becomes involved by extension along its ducts and the seminal vesicle becomes involved by extension through these ducts. The mechanism of epididymitis, as I see it, can be explained by the mechanism that we understand as bladder reflux. In bladder reflux with the bladder very much extended, just at the time when the ureter is expelling its contents, some of the contents of the distended bladder are caught within the orifice of the ureter as it contracts and as a result of that catching within, the urine is pushed up into the pelvis of the kidney.

No such thing as reverse peristalsis has been shown in the ureter, and no such thing as reverse peristalsis has been demonstrated in the vas deferens. What happens, I believe, is when the seminal vesicles are distended and for some reason or other the ejaculatory duct becomes closed, there is no drainage of the seminal vesicles; the contents of the seminal vesicle are kicked back down through the lumen of the vas into the epididymis. When they get to the epidymis they stop there because they can't go any further, mechanically, at least, and as a result of the

multiplication of bacteria within the tail of the epididymis the rest of the epididymis truly becomes involved in various places but only becomes involved very little which explains very well why it is that in gonorrheal epididymitis years after a man has had the epididymitis it is the tail of the epididymis that is hard, and that it is usually the cause for blockage following epididymitis. That particular finding explains a good many of these cases of so-called erotic epididymitis. A man may have had a good deal of sexual excitement without gratification and found he had a pain within his scrotum for a day or two aftterwards as a result of the overdistention of the vesicles and filling up of the epididymis from above. Once the contents of the epididymis have gone beyond the body of the epididymis, they cant go back, and as a result of the constant tension within, there is pain due to the fact that this particular bar is at the tail of the epididymis. Whatever that block may be I won't attempt to discuss. It also explains some of these cases of simple epididymitis clearing up within a few days. A man may have, as a result of straining, as a result of sexual excitement, possibly a very slight infection, and the contents go down to the tail of the epididymis and produce a little pain for a while, and gradually as there is relief of the tension within the tail or lessening of the edema of the ejaculatory duct, the contents of the epididymis are expelled.

This merely presents the very same thing that I showed before. It is only the tail of the epididymis that is injected and here is the middle portion, the body, and this is the head of the epididymis.

We have recently made some observations on the excretory properties of the epididymis and secretory properties of the epididymis that I think are quite vital, but I don't care to mention them as yet until we have definitely proven them.

Here is a radiogram of the epididymis injected in the living, showing only the tail injected, the vas was injected upward toward the bladder and downward toward the epididymis, showing a complete radiogram of the seminal duct. The other injections of the epididymis were postmortem. We found this also true in the living human.

Fig. 3.—Iodized oil forcibly injected downward in living subject through vasotomy fails to pass beyond the tail of the epididymis; no pain during injection nor irritation afterward.

Another interesting observation is this: Despite the fact that we injected chemicals down directly to the epididymis, we did not produce an epididymitis, which proves very well that injection in itself, that is, injection of the posterior urethra in itself does not produce an epididymitis, that there may be an infection in the posterior urethra and stirring up by the injection that might produce an epididymitis, but the injection of its own accord will not do it. That has been proven both in the human and in the animal and it is possible that this particular procedure of injecting chemicals down to the epididymis may be of therapeutic value later on. I have never attempted it in acute epididymitis because we have never gotten them early enough.

This is excessive fluid in the bladder itself. This is lipiodol, I think, 40 per cent solution, that is recommended for myelography, pyelog-

raphy and bronchography. This gives you an idea of the marked tortuosity of that vas. Here is where that vas loops around itself. The bladder is filled, I think, in this particular case, and that is the reason possibly why the vas assumes that particular position. Here are the seminal vesicles. I don't see the ejaculatory duct in this particular specimen. Here is an interesting thing. This is a complete roentgeogram of the entire seminal duct. Here is the tail of the epididymis. It was injected both upward and downward. This was in the living. You can see the tail of the epididymis injected and here you see the vas, the seminal vesicles, the ampulla of the vas and possibly the ejaculatory duct.

Another reason why I present this picture is to show you the possibility of the treatment of infections of the vesicle. Many infections of the vesicles are overlooked. The vesicles are tortuous, they have very poor drainage, they have no glandular structures as the urethra has. Despite the fact that the urethral glands often harbor infection for a long time, it is also true that they tend to ward off infection. Once infection gets into the seminal vesicles it tends to stay there so that infection of the seminal vesicles is truly called pus tubes in the male. It is a common cause for recurrences of gonorrhea and for systemic manifestations, particularly gonorrheal rheumatism. We know very well there are foci in the teeth that may produce systemic manifestations. There may also be foci in the prostate and vesicles. The prostate can be cleaned up as a rule better than the vesicles because the vesicles lie much higher and because of its tortuosity the vesicle cannot be massaged as readily as we would like.

About twenty odd years ago Dr. Belfield of Chicago suggested an operation and proposed it and has since practiced it. It has been universally applied, the operation vasotomy—the same procedure with which I made these particular vesiculograms. That procedure consists of pulling the vas out of the scrotum and injecting the vas toward the posterior urethra and in that way filling up the seminal vesicles and the ampulla of the vas with some antiseptic that will clean up that infection. That procedure is apparently simple; it is not as simple as it appears. There are a good many difficulties in doing it. You know how difficult it often is to give an intravenous injection of salvarsan. It is considerably more difficult to get hold of a vas and inject it. The technic, while apparently simple, has not been followed in detail by a good many and a good deal of trouble has occurred, and for that reason some urologists are not in favor of this procedure.

I don't say that this particular method of treatment of the seminal vesicles is indicated for any urethral discharge that lasts for a long period of time. I don't say it will cure every case, but there are definite indications manifested not so much by the symptoms, but are presented by your own diagnostic findings. In other words, the diagnosis is made by the findings in the rectum. I want to emphasize that while we go through a lot of radiograms for the male in backache, we often do not think of putting a finger in the rectum to establish the diagnosis. Backache in the male is always an indication for rectal examination. The symptoms of seminal vesiculitis present themselves with pain in the pubic region, and may also present themselves by symptoms due to its localization. In other words, while the infection is in the prostate, posterior urethra or seminal vesicles, the fact that these structures are so closely related makes it difficult to distinguish the cause for urinary disturbances when they are present.

An evidence of infection of the seminal vesicles during the course of acute gonorrhea is frequent or bloody or purulent ejaculations. That is evidence par excellence.

A large percentage of our chronic sexual neurasthenics are actual sexual neurasthenics

who have no gonorrhea. A good many of them have aches and pains in the abdomen or in the back and we often find that in many of these, chronic infections in the seminal vesicles are overlooked. The seminal vesicles are sexual organs that have very extensive innervation and any disturbance in them may produce many neurasthenic symptoms. As a focus for gonorrheal rheumatism the seminal vesicles are the chief site of infection.

It is true that persistent massage will clear up a large percentage of the cases of vesiculitis and another large percentage will clear up of their own accord. There are, however, cases that don't clear up with massage or with any procedure other than vasotomy, that is injection of some antiseptic, be it various silver salts, be it the newer dyes such as mercurochrome or any of the other iodized oils. The injection of an antiseptic destroys most of the bacteria and followed by massage clears up the infection. I recently had a man whom I vasotimized who hadn't been able to walk well for ten years as result of gonorrheal rheumatism. He said his earning capacity has been increased about four times over within the last three months because he can get around now.

I said that the vas is an elastic structure, that it was quite redundant. It is also enclosed within a sheath. During vasotomy you can lift that out of the sheath. In other words, it is a tube within a tube. I merely show this as a cross section of this structure to show you that the vas has a covering and it is loose within its sheath.

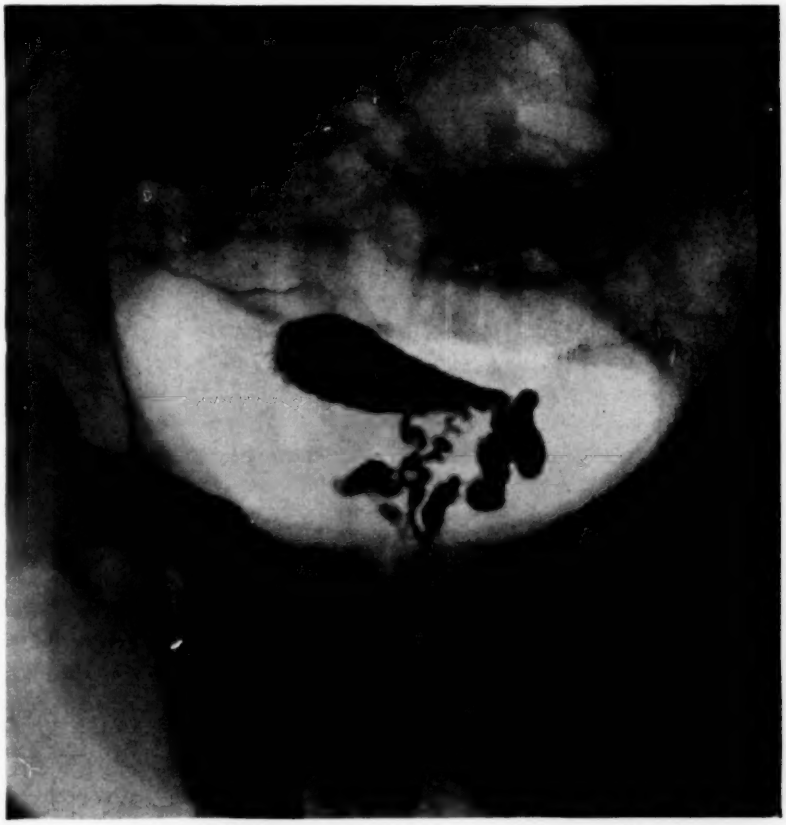

Fig. 4.—Vasa unite into one ampulla which again divides; surplus oil shows in one ejaculatory duct, apparently atonic, and makes large shadow in bladder. At (reader's) left; sheath of scrotal vas injected, fluid passes to internal inguinal ring.

Here is an iteresting slide in many ways, in showing anomalies and some other things I want to show. Here is the vas; up here is the overflow into the bladder. Here is the ampulla of the vesicle; here is the vesicle distended.

What I really want to show here is this: We injected not in the lumen of the vas but into the sheath of the vas, that is the space between the vas and the sheath. We found that we can inject up to the internal ring, not beyond that. This particular space at the urguinal ring has been described about seventy-five or eighty years ago by Bogros, so called Bogros' space at the internal ring where the vas deferens joins with the spermatic vessels to produce the spermatic cord.

Not only do we have pus tubes in the male, but also pelvic cellulitis in the male. In other words, there may be such a thing as pelvic abscess, so not only do we have vesiculitis but perivesiculitis.

We sometimes see a pelvic abscess, as a result of which we see extension of infection along the course of the vas deferens.

This is a postmortem specimen of the human injected from the seminal vesicle. This is a prostate and posterior urethra. This is the bladder. This is the sheath of the seminal vesicle injected downward. We found fluid forced down the sheath of the vas deferens, which proved, of course, that if a fluid can be forced down, bacteria getting beyond the barrier can also get down there; explaining a good many of the things that we describe as funiculitis, in the inguinal region, and very often mistaken for hernia.

In this slide we were able to force fluid down along the sheath of the vas and we were able to inject the fluid up to the tunica vaginalis. The vas has a number of sheaths derived from the fascia covering the abdomen. The sheaths follow the vas until it dips down into the tunica vaginalis and then they envelop the tunica. I believe that the ability for fluid to get down that distance also makes it possible for bacteria to travel along that route and it seems to me that that explains a good many of the cases of idiopathic hydrocele that we see.

Here is one showing fluid injected up to the point where the vas dips into the tunica and not beyond. Most of the injection is stopped at this particular space that I showed you in the living specimen and that is the particular space where funiculitis occurs, and sometimes with abscess radiating from the pelvis, radiating along the sheath of the vas at a point in the inguinal region, very often it is mistaken for hernia, and sometimes called industrial hernia. Miley Wesson of San Francisco reported last year some 75 odd cases that he had seen as a consultant in industrial surgery, of funiculitis that were called industrial hernia.

A method of procedure for the treatment of the seminal vesicles and for their medication has been recommended; that of putting a urethrascope or cystourethrascope into the urethra, locating the ejacuatory ducts and then injecting the seminal vesicles that way. That certainly is an ideal way of doing it. Out of thirty or more postmortem specimens examined it was very difficult to locate the ejaculatory duct with the naked eye unless one expressed the seminal vesicles and noted where the contents of the vesicles were expelled. In other words, the orifices of these ducts are almost microscopic.

Another thing to remember is that in infections of the seminal vesicles not only is the seminal vesicle involved, but also the ampulla of the vas, the dilation of the vas before it unites with the seminal vesicle. In this particular slide I show both seminal vesicles injected through the ejaculatory duct in a postmortem specimen, but you see no fluid had gone beyond the seminal vesicle. In other words, I couldn't inject the ampulla, which makes this particular procedure, even if possible, only a partial suc-

cess, because in attempting to medicate for infections of the seminal vesicle it is also necessary to medicate the ampulla, which is always infected.

You saw in these other slides how the entire vesicle filled up with the contrast fluid and so it is filled up with the antiseptic when injected through vasotomy, but not so through the ejaculatory ducts.

Any of you who may have been interested in the subject and may have tried to locate the ejaculatory ducts and tried to tamper around with them will find it a very difficult and laborious procedure and only the most skilful are able to do it and then only occasionally. It would be an ideal method of procedure, but unfortunately we have as yet not been able to medicate those structures through that channel.

Here is the postmortem specimen; here is a seminal vesicle here and you don't see any ampulla beyond that. This other side shows the sheath of the vas injected just as I described to you in the previous one, and in this sheath injection stops just about where funiculitis usually occurs. The seminal vesicle shows up very well here.

This is a very interesting slide. This was taken from Kohnstamm and Cave, describing urethrography, that is, radiography of the urethra. They not only show the urethra partly injected here, but they show the ejaculatory duct and very large seminal vesicles. This was done postmortem, evidently. You don't see the ampulla at all. In other words, the seminal vesicle fills up very readily. This was injected through the urethra. There are such conditions as patent ejaculatory ducts. In rare cases one may note that men who have strained very much at urination develop a little pain within the epididymis as a result of kicking down of some of the urine getting into the ejaculatory duct. This shows very beautifully a patent ejaculatory duct. While I am on the subject I just thought of something. I saw a man this morning who had phosphaturia. That is supposed to occur from some substances taken in the body that are excreted in the urine and make the urine partly alkaline. Phosphaturia may also be due to the fact that the contents of the seminal vesicles are thrown into the urine and precipitate the carbonates and the phosphates in the urine. I demonstrated phosphaturia in this particular individual.

Another physiological point is that the seminal vesicles do not remain filled completely until ejaculation occurs. In other words, let us presume emissions occur once in three or four weeks or every day, varying with individuals, but those emissions from the seminal vesicles are not the only time that the seminal vesicles expel their contents. That has been shown by our vasotomy experiences.

Some years ago Belfield took a hundred men, and examined their urine for sperm. He found nineteen of those hundred men had sperm in their urine, showing that these seminal vesicles constantly excrete or let out their content into the posterior urethra and then into the bladder.

This also shows a postmortem specimen of the prostate, seminal vesicles, seminal ducts, epididymis, testicles, bladder and, posterior urethra, removed in toto and then injected and radiographed, injected with a contrast fluid, either fifty per cent sodium iodid or bromide. These were injected through the ejaculatory ducts. In this particular case we could inject the ampulla. In a certain percentage of the cases we can't. This shows a stricture of the vas deferens somewhere along here. It is common in attempting to do vasotomy and in attempting to inject a seminal vesicle to find a stricture of the vas. There isn't any doubt that these strictures of the vas occur quite often. They usually occur in the vas within the scrotum and can be resected, but they are often met with

and they may be the cause of steriliy in themselves.

This is a postmortem specimen; it was quite old and as a result of relaxation of the sphincter of the ampulla we were able to inject not only the seminal vesicles but also the vas, as you see up here. This merely shows a complete roentgenogram of the entire seminal ducts.

The chief criticism against vasotomy is that inserting a needle into the duct may cause trauma and with the added irritation of the antiseptic cause so much damage as to produce a stricture, and in that way sterilize the individual.

Some time ago I did some experiments to confirm or disprove that particular assertion. This particular cross section of the vas of a dog shows the needle entered, but here is the lumen of the vas, and it is perfectly all right, I mean fluid can go through and undoubtedly sperm could go through.

This gives you an idea of what happens in the injection; reaction around the point where you inject and in the lumen of the vas itself. The epithelium of that duct is pretty well intact and remains intact unless it is damaged very seriously by some very powerful antiseptic.

Here is Collargol solution that was injected. It does considerable damage if you get it outside the lumen of the vas, and it is quite irritating so that it is wiser for those not having had much experience or those who are attempting vasotomies not to use that particular drug. Collargol remains within the lumen of the vas and in the vesicle for weeks after the injection and does no damage. Here you can see the epithelium in that vas pretty well intact. Within another week or ten days that collargol would be absorbed and no other damage result.

Here is a case of occlusion following vasotomy. However, here is what happeed in this particular case. In this case you can see the epithelium was intact; the epithelium of the vas resists trauma. The trauma in the cutting of the vas produced a very marked submucous inflammation and inflammation in the muscularis possibly and marked infiltration here, later resulting in scar tissue, and the result of that contraction of that scar tissue, compression of the lumen of the vas from without. That particular case shows very well that the results of occlusion of the vas aren't due to the drug itself, but due to the amount of trauma done to that particular very fine duct at the time of operation rather than the medicament itself.

I have covered the subject that is fairly large, and it has many points of interest that have only been touched on.

DISCUSSION

CHAIRMAN WALKE: I have been mystified by this magnificent showing of slides by Dr. Rolnick. In fact, I didn't know that such work could be done. It is a revelation to me and if I don't see or hear any more at this meeting I will feel well repaid for coming to see the wonderful work that Dr. Rolnick has done.

This paper is now open for discussion. Is Dr. Damon A. Brown of Madison present? If not, I will call on Dr. Edwin W. Hirsch to open the discussion.

DR. EDWIN W. HIRSCH (Chicago): There is very little for me to say about vesiculography or vasotomy after Dr. Belfield and Dr. Rolnick are through with the subject.

Dr. Belfield discovered the seminal vesicles, so to speak, because he is the first man who popularized, advocated and successfully performed vasotomy and injection of the seminal vesicles. Following him, Rolnick took up the work and probably is one of the most expert at the procedure today of injecting the vas. To inject the vas is a difficult procedure. It looks very easy. A number of men have suggested vasopuncture. Thomas of Philadelphia suggested picking up the vas, putting a needle into it and injecting the collargol. It is easy if it works, but it is disastrous if it fails because you might think that your needle is in the vas and it might be in the sheath of the vas, and you can inject 10, 20 or 30 c.c. along the sheath of the vas and think you have performed a wonderful operation until the next day when you get a wonderful swelling or a pain-

ful swelling in the inguinal region and you might get sloughing and epididymitis and have all sorts of trouble.

The best procedure is to make a small nick in the scrotum, bring out the vas, put a towel clip around it and inject it with a needle which has been blunted at the end. Take an ordinary needle of about size 22 capacity and dull it with a file or on a stone and then there is no danger of going through the opposite side of the vas and there is little danger of injuring the vas. A vasotomy is the course of last resort. A seminal vesiculitis should first be treated by massage and instillation of the posterior urethra. If that fails, give intravenous medication of gonococcal vaccine. Intravenous medication of gonococcal vaccine has been very successful in handling cases of epididymis. Some years ago it was a procedure advocated by Hagner to open up the epididymis if we had infection there and the operation was adopted by a large number who got good results. If a man got gonorrhea or some other infection in the prostate and vesicles, he often got epididymitis. We opened up the epididymis and he got well. Today we don't open up the epididymis any more. We give an injection of gonococcal vaccine or a diathermy through the scrotum and they get well. So we adopt a surgical procedure very seldom. If a man has continued bloody discharge or bloody ejaculation, pain in the inguinal region and if massage, diathermy, intravenous medication fail, then vasotomy should be done.

There is one other point and that is the diagnosis of seminal vesiculitis; it is not always easy because the seminal vesicles might be very closely matted to the prostate and if you have a stout individual, it is difficult by the palpating finger to be certain that you are touching vesicles or prostate. In such cases, I use the prostatic electrode, one we use for applying diathermy to the prostate or vesicles. I insert that high in the rectum and apply first to one side where I am certain I can touch the upper part of the vesicle and I ask the patient if that is tender. If he says it is, I bring it down, then ask if that is tender. If he says no, then I am certain that I am applying pressure to the vesicle. In other words, if you have a large individual it is very hard to be certain that we are getting there and the prostatc electrode helps us by palpating the superior part of the vesicle to be certain that we are touching the organ that is affected.

Dr. W. H. Holland (Cleveland, Ohio): There are two vaccines. One is made by Dr. Harold here in town, who used it for experimental purposes. I think it is strain No. 34; it is a very virulent strain of gonococci. I have used that for about four years. We start with an injection of 6 minims. The patient is kept in the hospital overnight because he might develop a temperature of 101, 102, or 103. The temperature goes up. I tell him that. Don't give him any water for four hours after the injection, and usually by the next day he is feeling quite all right.

The other vaccine that we use is a commercial preparation I found of value.

Dr. Harry C. Rolnick (closing): My friend, Edwin Hirsch, and I used to be and still are associated and we agree on almost everything. I think he agrees with me on vasotomy except that he wants to impress upon the audience that it is a procedure that shouldn't be taken lightly, that it isn't done as simply as one would think, that complications occur very frequently, that you can get your needle within the sheath of the vas much more easily than you can get it in the lumen of the vas, and if you inject anything that is powerful you have trouble in the scrotum or along the vas. I disagree with him that vasotomy is the course of last resort. I don't think it is. I think when a man has gonorrheal rheumatism and you have massaged him a few times for three or four or five weeks and you have given him vaccines and this treatment that we all think is of value, that is, in this particular thing—diathermy—when you have done that, and after giving him a decent trial for a few months, I don't think you have a right to let that man go on to develop organic changes in his joints. I think it is only fair to the individual that one ought to clear up the focus of infection.

Very recently in a symposium published in the Journal of the American Medical Association on the Etiology of Iritis, Foci of Infection in Iritis, they spoke of prostatitis. Only one man mentioned the possibility of the seminal vesicles being the foci of infection.

In the valuable manual of Periodic Examinations, put out by the American Medical Association, the prostate is mentioned as a source of infection, but the seminal vesicle is entirely overlooked. I don't think I am entirely one-sided on the subject; I don't think the seminal vesicles are the only part of the genito-urinary tract worth treating, but I do think they are far more important than we realize; they ought to be treated when infected.

As for massaging the vesicles, it is true that some men are stout and you can't get your finger up the rectum as far as you want, and occasionally the metal electrode or metal sound or the massager might be of value.

The fact remains, however, that once I lose sight of my finger or lose sense of feel of my finger I don't know where I am, and I prefer to get the man in any position I can so as to get my finger up high enough to get beyond the prostate and up to the vesicles.

It is amazing to see the men who come up to the office and who have been massaged by urologists, who have never had their vesicles massaged. A man will put his finger up the rectum and feel the prostate and think that is the thing to clean out. He should get the man in proper position, stooping over very far on the side of the table or knee-chest position on the table, which I prefer best, and get the finger up as far as he can to the vesicles. He may not feel them; normally they are not palpable and in certain pathologic conditions they are not, but they are present; they are large structures, they are not solid, but they are seminal bladders and they are of goodly size and they harbor infection and ought to be cleaned out in a good many cases.

Dr. Hirsch casually mentioned diathermy in epididymitis. I don't know that diathermy is of any more value in the treatment of epididymitis than ordinary heat. Epididymitis due to the gonococcus runs a routine course affected somewhat by medication. Vaccines may help a little bit. We don't operate on these cases because they clear up anyway. We only operate on epididymitis after it has lasted two or three weeks and definite abscess is localized and won't clear up and the body can't take care of the infection.

Another thing to remember is that excessive heat within the scrotum interferes with the function of the seminiferous tubules. It has been proven, for instance, that the scrotum is a thermo regulator. The scrotum has a particular function aside from a place where the testicles are to rest. The undescended testicles lying within the abdomen, within the peritoneum, under excessive heat have lost their spermatogenic function. If brought down early enough during the first few years of life, they will regenerate and produce sperm. However, if those undescended testicles remain undescended for twelve, fourteen or sixteen years, operating on those undescended testicles doesn't do much good in the way of allowing that individual to produce sperm from that testicle. If excessive heat does that to the testicle within the abdomen, it might do that within the scrotum during the course of an epididymitis, so I question, despite the fact that diathermy has value, the use of diathermy for any long period of time in the treatment of epididymitis. I prefer heat, hot baths; local counter-irritants will do almost as well.

THE STATUS OF PHYSICAL THERAPY IN CONNECTION WITH ORTHOPEDIC SURGERY*

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Physical therapy has come to be a valuable adjunct in the treatment of orthopedic cases. The natural physical agents, as light, heat, electricity, massage and exercise singly or in combination, give forth some very useful physical or chemical properties in the treatment of arthritis, rickets, tuberculosis, infantile paralysis, and other septic processes. Prior to the war these treatment methods were used by a comparatively small group of individuals with greater or lesser success and understanding. Only few understood the action of these natural agents as developed in the numerous appliances on the market and very few realized the great danger of their use, and often harmful results were obtained. These harmful results usually showed themselves in the form of burns of the superficial tissues and disorganization of the deeper structures. Physical therapy was looked upon by many as an illy developed science bordering upon quackery. Indeed, many members of the various cults applied physiotherapeutic measures solely as a means of financial gain and thereby disgusted most conscientious practitioners of medicine. The reconstruction work following the great war, first in Europe, and later in this country, provided an immense field for physical therapy. Men and women were trained in the use of these agencies and the manufacturers with their experimental departments in charge of trained men produced appliances which were safe and valuable in the treatment of diseased conditions. For a time we became so enthusiastic in the use of various physical agencies that it seemed we were going to the extreme in their use. We were almost led to believe that light and electricity in their various forms were cure-alls for all types of disease and deformity. In Europe especially, large departments were built in the various orthopedic hospitals, some of them occupying an entire floor of a building, in which there were placed appliances of all types, sizes and shapes. Some of them were operated manually, others were propelled by electricity. In visiting some of these clinics last year I found that for the most part the more cumbersome devices had been discarded.

Today physical therapy is being standardized, so that it is rapidly taking its place with other medical and surgical measures in the care of the cripple.

The successful application of the various agents in the prevention and treatment of muscle, nerve, bone and joint disease is now admitted by everyone. Much advancement has been seen in every department of this science. Great strides have been made in the use of hydrotherapy, one of the oldest and best known forms of treatment. It was realized that if water were to be a safe remedy for use in our athletic activities and in our schools, it must be free from disease. The United States Government made purification of water compulsory on common carriers. Chemical sterilization, though efficient, was in many respects not feasible. Boiling of the water in all instances was impossible. In 1916 the United States Public Health Service began experiments and studies to determine what methods of water purification were capable of meeting government requirements. The general knowledge that artificial light will sterilize water led to the extensive use of the ultra violet ray and to the manufacture of an apparatus which was in every way efficient.

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Today numerous athletic clubs, schools and hospitals make use of such an apparatus to render water safe for their swimming pools and for use in their hydrotherapy departments. In the treatment of traumatic muscle and joint conditions the legitimate use of hydrotherapy has no equal.

The ultra violet ray has been put to use in the prevention and treatment of deformities, especially those of rickets. The remarkable work of Steenbock is most interesting to the orthopedic surgeon and the pediatrician. Steenbock found that a variety of foods, including ordinary breakfast cereals, meats, milk, and egg yolk, could be endowed with rickets-preventing properties by exposure to the ultra violet ray. Claims are now being made by some of the efficacy of the ultra violet ray in the treatment of rachitic deformities by exposing the deformed extremity directly to the light. I doubt whether there are at hand any definite clinical data which would warrant us to use this measure as a routine in the treatment of rickets.

In the treatment of tuberculosis of joints and in the superficial ulcerations of tuberculosis as well as those of other septic processes the ultra violet ray, the mercury arc quartz lamps, and the carbon arc lamps have a very definite place.

Subacute or chronic joint infections, whether from direct transmission or by a metastatic invasion, are treated by no better adjunct than the artificial heat of diathermy. It is presumed, of course, that the removal of foci of infection and other rational surgical methods have been previously employed. The use of diathermy is of great value in our reconstruction work where fixations of muscles, tendons and joint capsules are to be overcome. In any chronic condition where maximum heat is indicated diathermy is the method of choice. I would warn everyone to refrain from its use in the acute traumatic or inflammatory stage of disease where there is already great heat in the tissues and already a presence of a maximum phagocytic action. In these cases I believe the further addition of heat would prove harmful rather than beneficial.

In infantile paralysis and in the traumatic paralyses where electrical stimulation is indicated, the various faradic or sinusoidal currents are used very extensively in connection with massage and corrective manipulation. Here again we must be most cautious in our selection of cases and the stage of paralysis, as a nerve which has most recently been paralyzed will react badly to stimulation and excitement.

In the spastic cases active and passive muscle training exercises, mechanotherapy and occupational therapy play an important role.

As I see it now, our greatest need is the standardization of physical therapy measures. I expect great things from the Council of Physical Therapy of the American Medical Association. In the report of this Council in the issue of the Journal of October 16, 1926, a splendid warning is issued against bad habits in the use of physical therapeutic agencies. The Council warns against allowing these measures to replace careful diagnostic and treatment measures.

We have long been convinced that this form of treatment as well as the diagnosis and management of disease must be in the hands of trained physicians or trained individuals who have had a thorough course of training in this subject and who have a very definite knowledge of anatomy, physiology, biochemistry and pathology. A course of postgraduate study, as is now given in some of the eastern universities, should be instituted in our medical schools. What we need is more trained men with a more thorough understanding of the use of the natural physical agencies at our disposal; men who will avoid the abuse of these agencies. Then and only then will physical therapy be placed on such a basis that we can expect the maximum of benefit for our patients and the minimum of harm.

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DISCUSSION

DR. S. C. WOLDENBERG (Chicago): I heard a very well-known physiotherapist make the statement in this hall last year that he would advise every chronic arthritis patient to get a little diathermy machine, take it home and use it as he pleased. At that time the chairman of that section did not permit anybody to discuss the paper; otherwise, I certainly would have discussed it and told him what I thought about it.

The reason I make this plea is I have been connected with the Veterans' Bureau for over four years, in charge of the Orthopedic Service whereby we had over 27,000 chronic orthopedic cases in our department. We have given over 100 treatments a day. Dr. Coulter, who is present, is aware of that because he was our consultant. They all seem to think that the physiotherapy department is the dumping ground: if they cannot get results, they send them to the physiotherapy department. We usually get all the neuro-cases. Physiotherapy may be of some help to these patients, but nevertheless we are getting cases where we cannot show what physiotherapy will do. We ought to at least draw up a program whereby we will educate the other fellows to know what physiotherapy means. This is nearly eight years after the war and we have not come to a definite working basis whereby men will really feel that physiotherapy has a place in the practice of medicine. It is not a cure-all; it is an allied subject to the treatment of disease.

As one of the young orthopedic surgeons I probably have a little more enthusiasm about physiotherapy. I do not know of anything that will do as much in as short a period of time allotted as diathermy in arthritis, providing that you have removed all your foci. Of course you might go over this case and still not find the focus of infection, but nevertheless you will not get as much relief from any other medicinal agent as from diathermy.

Yesterday I visited the Tri-State Medical Society and was in Dr. Crile's Clinic. While he was operating he wanted to point out something very important. here were about 150 men there. Before he opened the abdomen, he applied the electrodes, one on each side of the chest and gave diathermy during the time of the operation. Do not go home and try it immediately. First get the information. When you do an abdominal operation, naturally the temperature of the body is lowered. We have found that 3 degrees is the temperature of the liver. By giving diathermy during the time of the operation, you are capable of holding at least the temperature, which is normal, in the liver. This was done throughout the operation, and then when the thermometer was injected we found that there was no change; if anything it was a little above normal, showing that the patient has less shock by receiving diathermy during the operation than he has without diathermy. There is no danger in giving the ether, except that you should not give the ether where the fumes will go right on to the machine; keep the machine away. Have the machine over in the corner. These operations are done mostly with nitrous oxide anesthesia which is not inflammable. You can give from five to eight hundred milliamperes, and if the patient can stand it before you begin to operate, you can go up as high as nine hundred and a thousand, but eight hundred milliamperes is about the average to give. This diathermy is given twice a day, if necessary, just to increase circulation and to reduce the shock, and the patient can handle the operation in a much better physical condition.

The electrodes are placed on each side of the chest, high up, about to the ninth or tenth rib, so that the operator has a free field to operate.

DR. E. N. KIME (Indianapolis): It is a great delight to those of us who are teaching physiotherapy to the students and to those of us who are connected with the directorship of physical therapy in these hospitals to note how the orthopedic men are swinging into line. They are beginning to use physical therapy more and more. It seems to me that the answer to the problems that the Doctor has raised and which have been brought out so many times in this meeting by almost everyone who has spoken about the subject, is education, good scientific work—do the best we possibly can ourselves, make no extravagant claims, and educate the profession. The best way to educate, it seems to me, is not from the top, such as we are doing with our postgraduate work, but from the bottom. What we are trying to do for the most part now, or have been at least in the past, has been to put a foundation underneath the superstructure. I think the best way to educate is to build your foundation first, with good scientific courses in biological chemistry, biophysics, and all that sort of thing with our pre-medical students, and then plenty of good scientific academic and clinical instruction in physical therapy to our medical students. That is my particular field in life and that is the inspiration I am carrying home with me from this meeting.

ELECTRO-PHYSIO-THERAPY IN INDUSTRIAL WOUNDS*

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We have now entered a new era in the treatment of industrial wounds. Gone are the days when industrial accidents caused only simple fractures, cuts or bruises of the soft parts of the body. Those were clean wounds in comparison with modern industrial wounds. Today simple fractures are rare indeed; compound fractures constitute the majority of cases that come to the industrial surgeon; and many are comminuted with a vast amount of bone destruction —destruction that would be complete were it not for Physical Therapy, by the use of which many are cured, and useful limbs result.

The treatment of the industrial wounds of yesteryear was comparitively simple. But modern machinery has complicated matters. Today, grit, grease and chemicals are forcefully driven into the tissues, devitalizing the parts, and making replacement by nature almost out of the question. And each industry, and each kind of machinery causes different kinds of accidents, and thus different kinds of wounds. For example, injuries sustained in the oil fields are of an entirely different character from those occurring in the lumber camp, and those of the textile mill differ from those of the gasoline plant. Thus every industry has its own peculiar injury; every industrial wound demands its own selective treatment; and yet electro-physio-therapy is definitely indicated (and is almost specific) in all.

Electro-physio-therapy is a distinct science within itself. And yet one must not lose sight of surgical principles. It would be utterly foolish to discard the cardinal points of cleanliness, asepsis, drainage and dressings. Yet what more powerful sterilizing agent exists than ultra violet rays? Or what is more pain-relieving than heat? What is a more adequate treatment for shock than diathermy through the Splanchnic area? Or what form of passive motion is more splendid than the sinusoidal current? I answer, none! And I base this answer, not on abstract theory, but upon facts and experience. This is an age of industrial revolution and progress, and electro-physio-therapy alone has enabled the physician and surgeon to adequately treat modern industrial wounds.

The modalities of the industrial surgeon are: ultra violet, convective and conversive heat; and high frequency, sinusoidal and galvanic currents. With these available, no industrial wound should ever be neglected, for they are the bulwarks of an industrial practice—they are specific when the technique of application is correct. To have these modalities is one thing, and to correctly apply them is another, for it must be remembered that experience and judgment are quite as necessary in electro-physio-therapy as in any other medical specialty. The object of this paper is to present such technique and methods as have proved successful in actual routine practice, and not to theorize as to what might or could be done. With this thought in mind, let us first consider wounds of the soft parts of the body, where no bone injury has been sustained.

There are many wounds of the hands, face and scalp that are given only so-called "first aid" treatment, with perhaps a few subsequent dressings. Then there are wounds which show much devitalized tissue and bits of foreign matter (such as clothing, gravel, oil, dirt and other substances) that have been ground into them. These wounds must be cleaned as well as pos-

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sible under existing conditions. For this purpose I have found that ordinary gasoline will remove more grease and dirt than almost any other cleansing agent. It is even better than parafin oil, although sometimes an application of parafin, followed by gasoline, may prove more efficient.

After such wounds of the soft parts have been cleansed, a double erythema dose of ultra violet from an air-cooled lamp is administered, a 5 per cent solution of merurochrome is applied, and the wound is dressed in the usual manner. It is not necessary to remove all of the devitalized tissue at the first dressing; in fact, it is a mistake to do extensive cutting away of tissue until the wound has had a chance to heal; and any tissue that does not revitalize can be trimmed at subsequent dressings.

With such treatment it is not surprising to see healthy granulations appear in a wound that a few days previous seemed utterly impossible. If there is much swelling about the wound, the heat lamp is applied for twenty minutes before the next dressing, and when healthy granulations appear, the heat lamp is continued, and every third day ultra violet from the air-cooled lamp is given from one to three minutes.

These wounds heal with a soft, pliable scar, and local disfunction is seldom encountered. Should the scar adhere to adjacent tissue, or become painful, nothing has worked so satisfactorily in my hands as the application of a surface vacuum, or a non-vacuum electrode from the Tesla current, to the scar itself. This will stop the pain, soften the scar to a marked degree, and normal function of the parts is soon renewed.

Injuries to muscles, nerves and tendons, especially those about joints, give industrial surgeons much concern, for it is natural for one to hold a limb in a position which does not hurt, even though this be at the expense of uninjured muscles, and it is thus extremely easy for the patient to develop a cultivated muscle spasm when a certain group of muscles are injured and movement causes pain. I have several shoulder and knee cases in mind where the x ray showed no bone injury involved, yet it was impossible to move the joint in all directions.

The result of my observation is that the shortening of tendons and muscle spasms are best overcome by the application of heat and a proper splint. Diathermy is the remedy of choice, although in some cases radiant heat is useful; in fact, simple muscle injuries are best treated with radiant heat. In nerve injuries pain, is often relieved by the use of the galvanic current which seems to have a sedative effect to aching nerves. The galvanic current may also be used as a means of diagnosing whether an injury is of muscle or nerve origin, and the case treated accordingly. If nerves or tendons are severed, they must be united in the usual manner, after which the sinusoidal and faradic currents may be employed to hasten function.

Bone injuries sustained in modern industrial work range all the way from simple fractures to complicated compound-comminuted fractures. Some of these can be repaired by regular surgical methods. Others, however, do not readily heal, and these are the ones that come to the physiotherapist.

In cases which appear slow to heal, vigorous diathermy is used to stimulate callus formation in delayed union, and to this, surging galvanic current is added to increase the blood supply and to give added zest to the healing. The sequelae of bone injury may be an osteomelitis, or bone infection, and this unfortunate condition can be best overcome with diathermy, provided adequate drainage is present. If the drainage is not sufficient, it is well to establish it; then push diathermy to the limit; but it is not necessary to remove all of the sequestrum, for diathermy will induce absorption.

The method of procedure in stubborn cases is as follows: After securing good drainage, give diathermy, using two machines at the same time, lateral electrodes from one, and a cuff above and below the area, which is attached to the other machine. Give this treatment for fifteen minutes; then administer 30 grains of Sodium Iodide and three-quarters of a grain of guaiacol intravenously; and continue treatment for fifteen minutes. The sodium iodide and guaiacol are given every third day, but diathermy is administered daily.

Into the sinus, instead of using a quartz applicator from an ultra violet light, I insert a uretheral glass vacuum electrode from the Tesla post of the high frequency machine, and give tolerance for from six to eight minutes. I have had better results with this than with the ultra violet.

I also attend to the general health of the patients, a number of whom show calcium deficiency, which is supplied orally, and fixed with body radiation by the use of the ultra violet from the air-cooled lamp. I believe that this treatment is as specific for osteomyelitis as is quinine for malaria; in fact, I have never yet failed. The average time necessary to effect a cure has been twelve weeks; the shortest time seven weeks, and the longest time, twenty-two weeks.

Joint injuries are trying cases and require time and patience to secure the hoped-for results. Here diathermy from two machines is useful; the cuff electrodes above and below, and lateral electrodes through the joint. Following diathermy, add the sinusoidal current, manipulation, and massage.

The specific treatment of several joints is also worthy of mention. Wrist and ankle joints, for instance, are best treated by placing a cuff electrode above the joint, and the hand or foot, as the case may be, in a basin of water containing the other electrode. When the soreness has gone, apply the sinusoidal current, using the smallest amount of current necessary to produce contraction. The elbow and knee joints are treated with the cuff method in the simpler cases, but if they are stubborn I use the current from two machines, commencing manipulation, in either case, as soon as the soreness leaves.

Injuries to the shoulder joint present, possibly, the greatest variety, and, since several groups of muscles enter into the formation of this joint, it is extremely difficult to determine the extent of the injury, as a mere strain may cause more pain and impairment of function than a serious fracture. However, it has been my observation that the Deltoid and Teres Major muscles and the coraco-humeral ligament are the structures most often involved.

For these injuries, radiant light and diathermy are used in the early stages; but if the muscular spasm is obstinate, the arm must be manipulated under anesthesia, and extended above the head. The arm is fixed in a Thomas splint, tied to the head of the bed, and left in this position for several days. Then it is removed, and vigorous massage, manipulation, and the sinusoidal current are applied. Also insist on exercises which tend to strengthen and loosen the muscles, such as hanging on the rungs of a ladder, carrying buckets of sand or water, swinging a hammer, pitching a ball or rocks, or similar exercises which will cause each group of muscles to function. Again, since the various groups of muscles have different nerve supplies, I use the sinusoidal or faradic currents to enliven them by placing an electrode over the origin of the nerve, and touching the motor points with the other. This may seem a bit far-fetched, but the usefulness of a shoulder may depend on these things; and I have found them eminently successful in my practice.

Sacro-illiac strain is another uncertain injury that calls for many varied treatments, as the

unique anatomical position of this joint, with its five ligaments radiating in as many directions, is sufficient reason for the many vulnerable mishaps that may befall it. The posterior sacro-illiac ligament contains both long and short fibers, which run directly from the sacrum to the ilium; also other fibres which run obliquely, distally and medially, from bone to bone. With this peculiar condition, this joint has the possibility of being strained in five different directions.

Sacro-illiac strains may be so slight that a few treatments with radiant light will suffice; or they may be so severe as to necessitate the application of a plaster cast for weeks. Then there is the so-called chronic sacro-illiac strain, which calls for a specially devised belt that can be worn with great satisfaction to the patient. The belt of my own design is very simple, consisting of three bands of elastic truss material, sewed together with buckles which fasten in front. This gives adequate support, and also limits motion, which is quite necessary for the comfort of these patients.

The treatment of the moderately severe cases of sacro-illiac strain consists of the use of radiant heat for 30 minutes to one hour, after which the joint is strapped with snugly fitting adhesive plaster. In my own personal experience I have found that the infra red ray is more deeply penetrating than the ordinary heat lamp, and in sacro-illiac cases I prefer this modality to any other form of heat.

Should there be an appearance of tilting of the bones forming the sacro-illiac joint, or if one leg appears longer than the other, which can be easily seen by having the patient lie on the back and the limbs measured by placing the maleoli together, this condition should be reduced. A very satisfactory method of accomplishing this is to have the patient lie on the back; have an assistant hold the shorter leg steady on the table; then flex the longer leg to the thigh, raising the thigh on the abdomen as far as possible, at the same time making pressure from above—downward with one hand, while lifting the ischial tuberosity with the other; then straighten this leg gently in abduction, by a maneuver similar to the method employed in the reduction of a dislocated hip. This maneuver is extremely simple, but often neglected; yet it is of great benefit when correctly used. However, of all the many methods employed in treating sacro-illiac injuries, I have found that deep infra red heat penetration and strapping is the most efficient treatment.

Another condition which confronts the industrial surgeon is the treatment of ulcers, with or without varicose veins. Injuries that destroy a wide skin area often show healthy granulation, but no tendency to heal, but I have found that ionization with a weak copper sulphate solution is almost specific. Leg ulcers often arise when the skin has been knocked off; and burns are also another source of slow healing ulcers. These ulcers I always sterilize if possible, then apply radiant heat and ultra violet, and dress the wound with paraffin so as to prevent the dressing from sticking and scabbing. When ulcers are free of pus, I use copper ionization with the galvanic current. This is a valuable agent and should not be neglected, as it will cause many ulcers to heal that would not heal unless this method was used.

Head injuries are another group of cases that give considerable concern to industrial surgeons. By "head injuries" I do not refer to scalp injuries, but to injuries sustained by the skull and its contents. These vary in severity from a mere concussion to the severe fracture at the base. All of my patients who are suffering from head injuries are put to bed, carefully watched for pressure symptoms, and x rays are made in every case. Should these x rays show a fracture and pressure symptoms develop, open operation is imperative, and no time should be lost in having it performed. If, however, the x ray

does not reveal a fracture, the patient is made to rest in bed, ice cap to head, large doses of bromides and of magnesium sulphate are administered orally, and spinal puncture if necessary.

After a few days, if headache remains, I employ diathermy through the brain, using one electrode over the forehead, and one on the back of the neck. For this treatment, I do not use a strong current, usually 200 m.a., and never more than 300 m.a. at any time. The first treatment is given for fifteen minutes, and if subsequent treatments are necessary to relieve the headache, the time is increased five minutes daily up to 30 minutes, but the current strength remains the same. I have two cases in mind where diathermy had no effect on the headache, but galvanism did. In these cases I used the positive pole on the head and negative on the abdomen, giving 5 m.a. for fifteen minutes. Regarding the method of Burginon, I have had no result from ionizing calcium chloride through the eyes —a method that is highly recommended by some in the treatment of paralysis due to brain injuries. However, the cases I had were of several years' duration, and no results were really expected. Probably in recent cases, where this treatment is administered before dense fibrosis is formed, this method may be of advantage.

Besides the actual wounds of industry, the soul, or mental attitude of the patient must be treated as well; and this is admirably done by physiotherapy. Patients who develop a morbid mental condition should be encouraged; they should be assured that both time and patience are necessary to restore the injured parts; their confidence must be won; they must be made to understand that everything possible is being done for them, and that if there was any better treatment it would be just as easy to use it.

Often such patients show low vitality and low resistance, which must be built up. Some show calcium deficiencies, syphilis, or secondary anaemia with low haemaglobin and malnutrition. In this class of cases, where strengthening metabolism is of dire necessity, ultra violet body radiation with the air-cooled lamp, auto-condensation from high frequency, good feeding, and intravenous administration of iron, arsenic, sodium iodide and guaiacol; also calcium, manganese and iron, along with glandular extracts of thyroid, parathyroid or mixed gland preparations, given orally—these help materially in strengthening metabolism. Physical therapy cannot, and is not expected to do everything, but when combination is indicated, use it, and you will find that these things will turn apparent failure into success.

Realizing that to obtain success with physical therapy, the technique of application must be correct, and in order that others may profit from my experience, I wish here to stress a few points and methods that have proved successful in my hands, and a few lessons I have learned in my practice of physical therapy:

First and foremost, one must possess adequate, first-class equipment. Many have discarded physical therapy after what they thought a fair trial, only because their inferior apparatus was not capable of treating the cases at hand. Others have failed to realize that an intelligent knowledge of the physics of the modalities pressed into service is as necessary as time and patience. And still others are inclined to overtreat their patients, instead of staying within the bounds of reason and common sense. They fail to realize that physical therapy is as therapeutically accurate as any medicinal remedy. What physician would think of giving an ounce of medicine, if a dram was sufficient? So, why give overdoses of physical therapy? The answer is obvious!

In my practice there are a few rules which I believe to be essential to success, and these I invariably follow; and I also study each case as thoroughly as though it was a complex medical

problem. When an industrial wound presents itself, I consider what is needed. If accompanied by pain, is the pain acute or dull, superficial or deep? If loss of function has been sustained, is it due to nerve or muscle injury? If the wound has become infected, is the infection virulent or ordinary Answers to these questions suggest the modality to be used.

For superficial pain use radiant light and infra red; and for deep pain, use diathermy. For loss of function due to muscle injury, use surging galvanic current; or, if the loss of function is due to nerve injury, use faradic and sinusoidal current. For infection, use ultra violet and radiant light. Remember that the chemical currents are galvanic and ultra violet, and the mechanical currents are diathermy, faradic, sinusoidal and vibration. With these points in mind, one cannot go wrong.

I have also found that the simplest way to apply a current is the best way; and that such special apparatus as clamps, belts and the like are unnecessary. For diathermy I prefer the block tin electrode, held in place by elastic bandage or rubber bands. I have found the soaping of electrodes to be a waste of time; but one thing is important, and that is to wipe off the skin surface with alcohol or acetone before applying; then begin the treatment with low milliamperage, and increase to tolerance slowly. Always have your electrodes clean and bright. When they begin to tarnish, I scrub them with a heavy brush and some good washing powder, such as Bon Ami, an operation that will greatly increase their efficiency. Another thing to remember is to always have your apparatus up to maximum working efficiency. See that all connections are perfect; keep the spark gaps clean, condensers in good condition, and light burners free of dust; where moist pads are used, have them thoroughly soaked, and have the foot switch in perfect working order. Do these things, and you will be surprised at the ease with which you can turn apparent failure into success—through the medium of electro-physiotherapy.

In conclusion, I wish to say that electro-physio-therapy has found its place in industrial surgery. The outcome of many cases depends upon its intelligent use, and results are obtained that could not be achieved by any other known method. Its success or failure at the hands of industrial surgeons depends entirely upon their accurate knowledge of the physics of the modality used, and their application of the correct treatment to the case at hand. Then will it have passed the experimental stage, and be relied upon to produce certain, specific and gratifying results.

DISCUSSION

Dr Clarence M. Westerman (St. Louis, Mo.): It is very difficult to discuss or criticize a paper that is so absolutely perfect in all details.

I have proved conclusively some two years ago to one of the largest insurance companies in the United States writing liability insurance, that their physicians who used physiotherapy in connection with their regular surgical and medical methods of treating wounds, were able by virtue of the physiotherapy to reduce disability 50 per cent, and that I believe is a very conservative estimate. I think the day is soon coming when no insurance company will allow a doctor to do work who is not competent in the use of physical therapy.

If I were asked tomorrow what I considered the most valuable piece of apparatus in physical therapy for an industrial surgeon to use, I believe I would state unhesitatingly, the water-cooled ultra violet lamp.

So many of the cases are infected soft tissue wounds, due to the untidiness and uncleanliness of the patient; dirt, grease, etc., are ground into the wound. At any rate it is infected. My method of handling soft tissue wounds is similar to the Doctor's—cleansing the grease and dirt with benzine and paraffin oil, after which I use very liberal quantities of ether. I have found that ether poured into an open wound is one of the very best cleansing agents. After this, mercurochrome is applied and then the water-cooled ultra violet.

The water-cooled light should be cleaned at least once a week. The burner should be removed and cleansed with carbon tetrachloride, and the windows of your machine should be treated similarly.

One of the frequent injuries that we receive in industrial work is a sprained back. The symptoms are all subjective, aside, perhaps, of an objective symptom such as a spasm of the latissimus muscles. My practice in these cases is never to strap the back with adhesive. I don't put the muscle in a splint as some recommend, but I pin my faith entirely on my deep therapy lamps. Bear in mind that the deep therapy lamp is a dry heat and the solar light or infra-red light is a moist heat, at least that is the way I classify them. In other words, you can turn your solar light on a patient and it isn't many minutes until he is bathed in perspiration. You can put on the deep therapy lamp and his skin will remain dry for a considerable period of time. You all know the applications that are necessary for dry heat or moist heat. I recommend that you apply the same idea in handling these watts with your lamps. If you want a dry heat, put on your 1500-watt lamp; if you want a moist heat, put on your big solar light.

If these cases of strained back are handled by using your lamps, the disability should never exceed more than three or four days. The patient will always tell you after his treatment that the pain is gone. He will come in the following day and say there is just a touch of it left.

None of these treatments which we are discussing for strained back should be less than forty-five minutes, and from that up to an hour and a half.

In osteomyelitis I think the results are more startling when you use physiotherapy than any other measures that you may call to mind. I can recall in the past year several cases that have come in to my hands where fractures were not united, where open operations and plates were applied, necrosis set in and amputation seemed inevitable. In drainage sinuses, atrophied muscles and limbs the results have been so startling that I have had physicians to whom I have shown the plates before and afterwards in these cases be unkind enough to question the facts.

Dr. Waddington (Detroit, Mich.): There are two things that stand out prominently in the discussion. First of all, the Doctor has stressed that all modalities should be used. He gave us those modalities. You cannot practice physical therapy in surgery or any other specialty unless you have all the modalties. That is the first thing, and he has also shown you that physical therapy is not alone with the specialties, but that it takes care of all branches of medicine.

The second point is the saving in time, in money, in disability. That is one of the chief things to take home from this paper. When you tell manufacturers and patients that you are going to cut down the disabilities 25 or 50 per cent, you are talking a term where physical therapy is going to speak for itself. One of the greatest examples of that is the Aetna Life Insurance Clinic in Syracuse. It is a big corporation; they pay a man to head the physical therapy department and they spend thousands of dollars to save many thousands more.

In regard to some practical points in technic, I want to emphasize what I said yesterday in discussing a paper, that if I have granulation tissue, I do not get my short rays down in contact too far with that granulation tissue for it will kill that tissue. If you have infection, use your water-cooled lamp, yes, but when you dispose of your infection and you want to build up the wound, then use the air-cooled lamp at a distance of about 20 inches. If you use the lower wave lengths or come in too close contact with the wound, you are going to defeat what you want to accomplish. Bear that in mind. That is absolutely correct. It is common sense and relies upon physics.

In regard to scar tissue, the Doctor's technic is correct. Any man who is doing industrial surgery will tell you that you can get some wonderful results from your negative galvanic pole on scar tissue on the surface.

Also don't forget that when you want heat there is another heat besides diathermy. Visible light can be converted into heat the same as diathermy and the indication for the radiant light and heat lamp, so-called, is simply where you used to use a tack hammer, don't use a sledge hammer. When the lesion is superficial, use your lamp because we know from the physics of diathermy that the heat is going to be more in the center between the two electrodes; therefore, use your lamp for superficial heating.

For sensitive conditions, like sprains and strains, think of your radiant light and heat first and when you give these don't give them for ten or fifteen minutes. It takes time to get results with physical therapy; you can't get results by giving indefinite treatment.

Dr. J. U. Giesy (Salt Lake City, Utah); There are one or two little things that I feel called upon to say. I want to stress again the effects of ionization in scar tissue. I want to suggest that in many of these cases of trauma where diathermy and other modalities do not apparently relieve the pain as rapidly as you would wish, an ionization of KI or an ionization of sodium salicylate from a negative pole will sometimes work.

I wish to speak also of the fact that the ultra violet light applied to the sacro-iliac region will frequently do a lot to relieve the pain in these sacro-iliac strains.

I want to compliment Dr. Walke very highly on bringing out this point. All these modalities, gentlemen, blend. There is no hard and fast rule of separa-

tion. You must have an equipment the same as the painter who has a series of colors in his color box with which he blends his colors in painting his picture. The practice of physical therapy from a curative standpoint consists in blending modalities, not in depending upon anyone, but in using your knowledge of the physics of those currents, in blending your modalities so as to shade your picture and get the finished curative result.

Dr. T. T. Gibson (Middlesboro, Ky.): I am located in the coal fields of Kentucky and therefore have some of these infected wounds from the mines. We call it bank poison. It is a very serious infection coming from the dirty water inside the mines. While I haven't the water-cooled lamp, I have every other physical therapy machine. If I get these wounds early and apply my radiant light and air-cooled the day that the wound is produced, I never have an infection. That is without any exception so far. Where I don't get the cases until the infection is already established, with this treatment the infection disappears within a few days' time and I get the injured man back to work at least 50 per cent quicker than by other methods. When the infection has been done away with, then for the reconstruction of the wound I raise my alpine thirty inches from the wound; the granulations form rapidly.

Dr. Frank H. Ewerhardt (St. Louis, Mo.): I would just like to ask the essayist whether he would be kind enough to restate his high frequency technic in the treatment of sinuses. Why use the words "electro-physio-therapy" when physical therapy seems to be so inclusive?

Dr. Frank H. Walke (Closing): I wish to stress the point Dr. Westerman brought out about the water-cooled and the air-cooled lamp. You must have the two modalities. You can't expect an air-cooled lamp to take the place of both. The indications are entirely different and the therapeutic action is entirely different. Therefore, we must use both when indication arises. An air-cooled lamp will not do everything; neither will a water-cooled lamp.

In regard to sinuses, the reason I said that I prefer the use of a vacuum or non-vacuum urethra electrode in a sinus is that in my experience we have sinuses that run in such directions that in tilting the water-cooled lamp to go in there the mercury meets and puts the lamp out. That is just a practical point. Therefore, if we use a glass electrode from the high frequency current, that is, the Tesla, possibly, that current is constant and you can place the electrode into the sinus in any manner, shape or form to conform with the sinus. It is curved and has a point, and it is easily applied.

Dr. Westerman said he applied ether in the treatment of these wounds. I used to do that, but it didn't seem any more advantageous than the ordinary gasoline to me, as long as infections of those wounds or secondary infections were not changed by the technic, of, say, paraffin oil and gasoline.

Chairman Willmoth: While you are on that point, I would like to inject this question: Is it true that this ethyl gas that is now on the market is highly irritating to tissues

Dr. Walke: This ethyl gas is very powerful and they caution you not to use it on wounds or on the body. In fact, I know in my experience as a surgeon for the Standard Oil Company that when the men were handling ethyl gas they had what they called still poisoning, that the doctor called bank poisoning in the coal district. It is nothing in the world but a skin infectin of the hands or the skin which it comes in contact with, and so they caution you not to use it and not to use it for cleaning clothes or for anything other than for fuel purposes If you use gasoline on wounds, be sure that you are using gasoline. If there is any doubt about it, use benzine instead. We get a good quality of gas because it is manufactured in Shreveport.

In regard to sprained back, we use a deep therapy lamp. Dr. Westerman says he doesn't apply adhesive. I do not in all cases, but in some cases we do, and we always, in treating the case at hand, have another modality or remedy in the locker, and if strapping is indicated, why of course we use it to limit the motion. I don't believe in putting on plaster casts for that particular condition because a little motion is desirable, but that motion must be very limited. However, some back injuries resulting from a fall 50 or 60 feet from a derrick, and we have contusions as well as back strains, even though the x ray shows no injury to any bone. Those cases are the ones that I had in mind when I said putting some in plaster casts.

We spoke about time and patience as a necessity. They are. As Dr. Westerman said, don't be in a hurry to treat these cases. That is the reason that the insurance companies fear physiotherapeutic measures for treating these injuries. The injured will go to a doctor and he will put a light on for a few minutes, then say, "Come back tomorrow," and another charge. You have to be equipped for it. Have enough machines, light and room so that you can put a patient under a light or on a high frequency machine and let him stay there an hour or two hours if necessary, so both time and patience are necessary in treating these wounds.

In speaking of osteomyelitis, I have tried the ultra violet and heat therapy and frequently used radiant

heat before using diathermy. It has been my observation in the cases where I use the two-machine method, using the portable machine for my lateral electrodes and my large machine for my cup electrode, that I get more heat into the tissues, and the experience is that these wounds heal quicker. The patient will tell you, "My, that treatment you gave me yesterday made the heat stay in there a long time and it felt good." With the two-machine method, of course, as a matter of physics there is current going in two different directions; with the high frequency current causing oscillation of the cells, naturally you will have a little more rise of temperature in the joint.

Negative galvanism in scar tissue is excellent. I use it. The scar I had in mind is where it is painful and sticks up and is highly red. I had in mind a case that would heal this week and next week the scar would be painful. and we applied it in that manner.

Then we must blend our modalities, as Dr. Giesy has pointed out. He stated that you can't take one modality and make it do for another. Therefore, we must have everything that is necessary.

One doctor mentioned the sinus. The urethra electrode is smooth and easily applied; take that right into the sinus. I find I can handle this better than I could with the water-cooled lamp.

The two-machine method has proven better with the bifurcated cord. If you put a bifurcated cord on you get heat concentrated at one place rather than another, and going in the most direct line. I have found that the two machines are far better than the use of a bifurcated cord.

THE TREATMENT OF COLLE'S FRACTURE BY DIATHERMY AND OTHER METHODS*

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The topic under discussion, the treatment of Colle's fracture by diathermy and other methods, was chosen primarily for the benefit of the general practitioner who is essentially not a specialist. The paper aims to emphasize the importance of the role which physical therapy plays in the treatment of fractures and the fact that an elaborate equipment is not necessary to carry out this program.

The essence of any scheme for the treatment of fractures is to secure complete restoration of function in the shortest space of time. This is dependent upon a solid bony union and a healthy condition of the soft parts about the site of fracture and the adjacent joints. The old school placed all the emphasis of its teachings upon the attainment of perfect alignment and solid union, even at the expense of loss of function. The fear that the least degree of displacement might lessen the normal stress power at the time of ultimate recovery and that the slightest degree of motion would interfere with proper union, formed the basis of this line of reasoning. However, the resultant loss of function, to a greater or less extent, following so large a percentage of cases treated in this fashion, set men to thinking and reasoning—with most fruitful results. It was discovered that far too little attention was placed on the importance of restoring the normal condition of the injured, crowded and displaced nerves, muscles, tendons and blood vessels. It was also noted that a crippled condition of hands and feet could be restored to normal by freeing the tendons embedded in the cicatricial tissue to the bone at the site of fracture. Likewise the releasing of the nerves caught in the matting brought about relief of pain.

The next step of reasoning was a natural one. The question, "Why allow these conditions to develop?" was answered by Championniere of

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Paris in the late eighties. It was he who preached and practiced the gospel of mobilization treatment of fractures. His immediate following was not large and it was not until the last decade, more particularly the world war, that his teachings became successful. They were accepted to such a degree that today very few surgeons continue to adhere entirely to the old school of long and uninterrupted mobilization. Rather the question today is, "How much free movement may be allowed and how little splinting may be indicated?" Surgeons today are discussing the important factor of the length of time it is advisable to keep on splints, fully realizing that a brace does harm when it does no good. No table of figures stating in precise terms how long a splint should remain fixed in this or that type of fracture can be devised, for there are many factors which must be considered in this connection, namely, the nature and the extent of the injury to the bone, muscle, tendon and nerves; and the age, general physical condition, occupation, surroundings, etc. A good general rule to follow is to allow the splint to remain permanently fixed until union seems sufficiently firm to allow temporary removal and gentle movements. This is not a very concise rule, I grant you, but one that experience will help to make more clear. In the case of a simple Colle's fracture this would mean that the splint may safely be removed for gentle massage and careful movement instituted as early as the third day. In this type of fracture there is little danger that with careful handling the approximation of the fragments will be disturbed.

Since massage forms so important a factor in the treatment of fractures this seems an appropriate moment to discuss it. The general profession grossly misinterprets the meaning of the term massage,—what it means and what it does. Too many doctors think of it in terms of violent mashing and mauling of muscles, whereas massage, as related to the treatment of fractures, consists of the most gentle handling of the parts imaginable. Massage, as herein implied, either before or after the fracture has been reduced, is a gentle rhythmical motion above the seat of fracture so light to the sense of touch of the operator as well as the patient, that it may be only barely perceptible. The first and prime object of this type of massage is the relief of pain which is the cause of the muscle spasm accompanying all fractures.

The technique consists, first of all, in placing the injured arm in a perfectly relaxed and comfortable position, either on a table or resting on a pillow in the lap of the operator. The operator then performs very gentle stroking movements commencing at the point above the seat of fracture and continuing upward to the elbow joint. The relaxed finger tips of the operator should closely follow the contour of the surface at all times. Movements should be performed slowly, evenly, and rhythmically for from twelve to fifteen minutes. The criterion as to the accuracy of the technique is the almost positive relief of pain and spasm. No satisfactory theory has been advanced to explain this phenomena, but the fact is that pain and spasm can be relieved by this kind of massage. Usually after three or four days a more vigorous pressure may be instituted to advantage. A deep stroking movement may be used to drain the venous and lymph channels and improve the disorganized circulation in general, for we must remember we are not only treating a broken bone, but also damaged muscles, and our aim is the return of complete function as soon as possible.

It has been found that heat greatly enhances the effect of massage. It definitely stimulates the circulation favoring thereby the formation of callous, and conversely lessening the chance of delayed union which, we are told by the pathologist is frequently caused by an insufficient blood supply. There are several good methods of applying heat with which most of us are familiar. In many institutions and doctor's offices the high frequency machine producing diathermy is available. It is an excellent, probably the very best modality at our disposal. A convenient and effective method of application is to place

the cuff at the upper forearm with the fingers in a saline solution. Another is the through and through plan at the site of fracture which is particularly indicated in suspected delayed union. Radiant light and the more recently mentioned infra red rays are extremely effective, easily and conveniently applied heat modalities. They have entirely superceded the dry superheated air apparatus of bygone days. However, if the above mentioned modalities are not available, a home made superheated contrivance can easily be arranged by directing the heat generated from a large oil lamp through a stove pipe to the injured part which has been covered by a wire netting supporting a sheet or blanket. Another convenient method of applying heat which is particularly appropriate for home use, is the contrast bath. The forearm is immersed in water as hot as can be definitely borne by the patient, allowed to remain for five minutes, and then plunged into cool or cold water that has a temperature anywhere from 80 to 60 degrees. The arm is allowed to remain in this cold bath for one-half minute. The alternate hot and cold application is repeated for a half hour three or four times a day. This is exceedingly efficacious as a vasomotor stimulant and is particularly useful in chronic disabilities. It may, however, be also used in connection with fractures of the forearm if due caution is exercised. The forearm must be properly supported by anterior splint and the patient must be cautioned not to make sudden movements. A similar effect may be obtained with the use of deep therapy lamps by applying an ice cold towel over the forearm at five-minute intervals.

Proper movements and exercise constitute another important factor in the treatment of fractures. It is because we have for so long a time treated only the bone and not the muscles and tendons, that joint movements were given but little thought. Today, we appreciate the importance of early movements of the fingers in fractures about the wrist. This is fortunate because when properly performed no possible damage to the fracture can occur; on the other hand, proper joint motions produce a free play of the tendons over the site of the fracture and thereby prevent matting of these tendons to the bone. Another good reason for applying early motion is that it assists most effectively the return flow of lymph, thereby combating a condition which is always present, namely lymph stasis. Of course, it is needless to state that no violent movement is indicated and that only such movements are permissable which in no way can disturb the approximation of the fragments. In our practice we begin complete flexion and extension of all the finger joints as early as the second day. The movement is a passive one, performed by the operator, because we desire complete flexion and extension of each joint. In certain cases we teach this to the patient with instructions to perform these finger movements during the day. We also instruct our patients to practice voluntary contractions of all the arm muscles without producing much motion, that is to say, it is a type of auto resisting movement in which all the muscles of the forearm are contracted and relaxed. The next step is to give the patient a compressible article like a solid rubber ball which he places in the palm of the hand and squeezes to a point short of causing pain. We like this device exceedingly well because muscles work very much better against resistance than without. Another device is to place a newspaper on the table and to ask the patient to gather it together into a small mass with his fingers. This brings into play the fine as well as the gross movements of the fingers in a most effective fashion. Movements and exercise of this type are practiced for about a week; that is, until we feel that sufficient union has taken place to allow us to proceed to a more vigorous form of exercise. This period is indicated when pain has disappeared and tenderness is no longer present at the site of fracture. At this point we begin more active exercises and choose as a means of application a one-pound Indian club. The patient is asked to hold the club with the tips of the fingers and thumb and

is instructed to bring about a circular movement of the club, which motion is later reversed. From this simple movement, progressively arranged exercises are given the patient until at the end of the third week we have him perform movements which bring into play free flexion, extension, abduction and circumflexion. I know of no devise which can bring about this series of movements in so simple and effective a fashion as with the aid of the Indian club. It has a further advantage in that it causes gross movements of the entire arm and shoulder. This is very desirable. Not infrequently the very force which causes the healing of the fracture also produces a bruised condition of the shoulder joint which condition remains unnoticed, because the arm is usually placed in a sling and left there for three or four weeks. It is then discovered that the bruised condition has developed into a more or less stiff shoulder joint, due to the immobilization to which it was subjected. Still another reason why we like club swinging in this connection is the interest it arouses in the patient himself, which interest is translated into helpful co-operation.

We will now attempt to summarize briefly our method of treating a Colles fracture, which method is employed in other fractures with certain modifications to suit the conditions. The fracture is supported by an anterior and posterior splint in such a fashion as to allow free play of the fingers. We begin our treatment the second day by carefully removing the posterior splint, then subjecting the part to some form of heat application which is followed by very light stroking massage and passive movements of the fingers. The posterior splint is replaced and the arm hung in a splint until the next day. The patient is instructed to use his fingers but never beyond the point of pain. This proceeding is followed until the end of the first week when examination will determine whether or not to omit the posterior splint. If the decision is in the affirmative the anterior splint is supported at the forearm near the elbow at the wrist, and below the thumb by means of adhesive bands. At this point of the treatment we progress more rapidly, both with respect to massage and exercise, aiming at a maximum amount of work and being guided by the presence or absence of general pain, swelling and more particularly tenderness at the seat of fracture. If any of these indications appear, we feel that the exercise treatment has been too vigorous and it is consequently cut down. We prefer diathermy as a method of heating, although we have treated many cases with only a deep therapy or infra red lamp. The essence of success in this method of treatment lies in the ability to recognize the degree of massage and movement which is to be instituted. If successful, the period of convalescence is most definitely decreased. Many have a very good functioning hand at the third week, by which we mean the ability to perform all necessary routine movements required during the day. Heavy lifting or any violent form of exercise is of course contraindicated until after the sixth or seventh week.

DISCUSSION

Dr. B. H. Sherman (Dexter, Iowa): We feel that this paper is timely inasmuch as it has evolved upon the insurance companies (I speak more particularly of the Fort Wayne people) to double and triple the price of insurance. There is possibly a reason behind it. They claim that due to improper treatment of fractures and all manner of injury that the human is subject to, people are inclined especially now in this restless time to proceed to sue you at once if there is a possible chance of getting any money out of you. Therefore, as I say, I think this paper is timely.

There are about 16 moving parts here in the wrist. When we stop to think of a part that is used so freely being immobilized from three to five weeks, we can easily see how it is possible to get contractures and adhesions. These are coming more and more to the attention of the physical therapists because they are being relied upon to help these conditions. In some cases it seems to be almost a hopeless task.

Of course, the ultimate desire, as the essayist stated in his paper very aptly, is to get the patient back to work at the very earliest possible moment. I think it is imperative that every fracture, whether it is of long standing or not, should be x rayed first.

In the proper reduction of a Colle's fracture the time to realize that you have a proper reduction of the fracture is when the joint is not painful. A properly reduced Colle's fracture should not be painful unless it has been tied up in a splint, immobilized over a period in which you get contractures and adhesions.

There is one point in the doctor's paper that I think ought to be stressed as it is very important, and that is regarding the length of the under splint. That splint can be made to come barely past the palm. We were taught, of course, to mobilize joints on each side of a fracture. If that under splint is brought down so that the fingers can be moved, and this can be started early even if the patient is a distance from the office and can't get back for a week, motion can be started, thereby loosening up the ligaments. I don't know whether the doctor follows that plan or not. I would like to ask him if he does. Remember there are two large arteries and two large veins to be considered, and also three nerves besides the 16 moving parts. These structures are important when handling a Colle's fracture.

Dr. F. N. Cloud (Danville, Ill.): One thing that I noticed in this paper and also in the discussion was that neither of the men who spoke told how they reduce a Colle's fracture. I think there is only one way and that was taught by Dr. J. B. Murphy. If everybody would follow that plan, there wouldn't be very much trouble wth Colle's fractures. I think it is the only way to reduce a Colle's fracture. There has been a great deal said since the World War about treating fractures. If there is any one fracture of bones in the human body for which the treatment can be standardized, I think it is the Colles' fracture. The simple method of reducing and the simple method of application of the splints and the very simplest splint you can imagine make that possible. I don't know how many here are acquainted with the Murphy plan of reducing a Colles' fracture, but it is very simple and very efficient and will reduce it nicely.

I have heard this plan offered: Your assistant to catch hold of the arm above the elbow and pull until you get it into place. There is no need of assistants at all. I have reduced probably a hundred or more of them without anybody about. I have reduced them on the road. The longest splint we need for this fracture is a long posterior splint and a short anterior splint which should not come far enough down to impinge upon the bones of the hand or the wrist. It should come just below the end of the radus. The posterior splint should come down probably to the middle of the interphalangeal joint. That can be shortened; you can cut off the back splint even with the anterior splint on at least ten days, because if you get a proper reduction of the Colles' fracture there will not be any pain and there will not be any displacement at all. It is a matter of mechanics as to why you use a posterior main splint and not an anterior, because you can apply a straight beard to a straight surface, but you cannot apply a straight board to a curved surface. We all know the curved surface of the arm is on the anterior or palmar side. They say you can pad them up. You can't pad them up as easily as you can put a straight splint on a straight surface. These should not be put on tightly. The danger in putting on a long anterior and long posterior splint is the pressure you get and the permanent paralysis or loss of use or loss of function of the hand itself. That can occur within twenty-four to thirty-six hours, as I have seen.

The simple reduction by the Murphy method of reducing Colle's fracture, with the long splint on the posterior side and the short splint on the anterior side, gives your position within two or three days and you have the man back to work within five or six weeks. I have had them go back to working on railroads and in mines within five or six weeks. I can't do anything better than you can or anybody else if the Murphy method is used.

The Murphy method of reducing a Colle's fracture is to completely free the fracture of the bone by taking it just in this position, your two thumbs on the arm, one on the radius and the other on the ulna, just back of the fracture. Then with your fingers, increase the deformity, completely loosen up the fractured end, throw it back so it is almost up to right angles, and with a sudden motion go forward. Hold it tightly until you get the splint on and the work is done. Occasionally you will find the head of the radius not only displaced backwards, but on the thumb side or medial side of the arm. In that case you will have to put one thumb on the thumb side or medial side of the radius, and the other one on the back side, increase your deformity, throw it clear out of place, loosen it up perfectly, bring it forward with a sudden position and your reduction is made. Hold the hand and put on the long splint here and the short one there and don't bandage it too tightly, because if it is reduced, it is going to stay nine times out of ten. Very little treatment is required from then on.

Dr. Ewerhardt (closing): I did not make this paper as complete as I might have done. I might have included in the paper, as the doctor so ably demonstrated, the methods of reduction and more, the question of splinting. I want to thank him for assisting in bringing out this important feature of the paper. I intend to dwell more upon the mobilization part rather than on the reduction. I let that go by; that is the reason I didn't mention it. Of course, we x ray every case that comes to us and also test for injured nerves.

Dr. Sherman mentioned something about the fact that so many doctors think it is a simple sprain when it is a fracture. Let's go one point further. On this past Monday morning a patient was brought to me, a little girl about 14 years old, who had a fall probably eight or nine weeks ago. The doctor to whom she was entrusted said it was a sprain. He said, "Stay off your feet for a few days." He bandaged it a little bit at first and told her it would be all right. It was painful, and after a few days the mother got the child a pair of crutches. Things went on for eight weeks when she came to us. We then found a fracture of the fibula and a comminuted fracture of the tibia, a horrible fracture. It was allowed to go eight weeks and the doctor diagnosed it as a sprain.

We take x rays of every case. The splint, it is quite true, should only come up to the palm of the hand, just beyond the joint, so that there will be free motion, and the posterior splint should come to the tarso phalangeal joint.

The method of reduction which the doctor referred to is one that I am not familiar with. I have seen it done, but it is not the one we use. We use Sir Robert Jones' method.

ENDOCRINES AND PHYSIOTHERAPY*

MAXMILIAN KERN, M. D.
CHICAGO

It was but a very short time ago that the treatment of thyroid diseases was purely empirical, and likewise the administration of iodin was equally as empirical. Today empiricism is replaced in a large measure by basal metabolism tests, by means of which we can determine whether or not the patient has progressed favorably or whether some degree of harm has been done.

Not so very long ago the use of the actinic ray, or galvanism, for the treatment of thyroid diseases was accompanied either by the remark that it cured everything or by the mere apology of the man who tried to determine its clinical value.

THE PITUITARY

I have tried to collect from my own practice and from the clinic with which I have been connected for several years, some data on the proper and judicious use of physiotherapeutic agents in diseases of the glands of internal secretion. Very few general practitioners realize that among the common causes of headaches, so-called *migraine*, nasal conditions, sudden changes within the bony framework of the human body, are accompanied by alterations in the region of the pituitary gland.

I followed many of the x ray pictures of the sella turcica, and to my great amazement found (I have a collection of 400 pictures) that a great percentage of them plainly reveals that there is pathology around the seat of the pituitary gland. The fact is that there would be absolutely no need for guessing if we would but endeavor to search for the cause and study the x ray picture.

The measurements of the sella turcica are very relative, true enough, but the ratio of the width to the length of the axis is fairly definite. The outline of the sella turcica with the anterior and posterior clinoid processes is so fairly uniform in most cases that a deviation from normal could very easily be recognized by a student of the subject.

When we know that the pituitary gland is hypofunctioning, we can stimulate that gland by the administration of some form of pituitary substance, either anterior or posterior. However, we have no remedy for the hyperfunction-

*Read at fourth annual meeting, Amerilan College of Physical Therapy, Chicago, Nov. 4, 1925.

ing pituitary gland, and it is in such cases that we have to revert to physical therapy.

About three years ago I reported a case (which was the very first on record) of pituitary blindness in a young man who was in the army and came home perfectly healthy, when suddenly he found that he had failing vision. He went to various physicians in some of the very best clinics who searched for the cause in the stomach, in the intestines, and even resorted to a gastroenterostomy because of his headaches. The fellow lost complete vision in one eye and developed a field of vision in the other which was so narrowed that he could hardly distinguish light from darkness.

This case was brought to me in exactly the same fashion that it would be brought to a physiotherapist. "We have tried everything, doctor. Do you think that his glands might be out of order?" I told them it might be very possible, that sometimes the glands were out of order, but I didn't think it had much to do with the eye.

We found during a routine examination an abnormal sella turcica. By the administration of proper endocrine medication, plus a constant checking up by the x ray, plus toning up and stimulation with the ultra violet ray, we have gained complete vision, 20/20 in one eye. The other has an optic atrophy and obviously, nothing can be done.

This case was reported about four years ago. Subsequently two or three reports of similar cases appeared in England, and quite recently I received a report from the physiotherapist at the Bellevue Hospital in New York that he had had a very similar experiece with a case of pituitary blindness.

THE PARATHYROIDS

The parathyroids came into some prominence as a result of studies in many fields. The deficit of calcium in the blood may be attributed to certain diseases and in particular to glandular dysfunction Recent experimental work on the parathyroids has thrown much light on this subject.

In order to augment the calcium in the tissues, parathyroid extract is now employed, although its use has been greatly restricted because of the failure with this product. Thyroid substance is very frequently prescribed because it seems to produce the effects of parathyroid more efficaciously in many instances. It is acknowledged, however, that the administration of thyroid is based purely on empiricism.

In order to 'fix" the calcium in the blood, ultra violet light is the agent of choice because its value has been conclusively demonstrated by several leading workers in light therapy.

GOITER

The thyroid, with special reference to goiter, has been a subject of great controversy between the surgeon and the internist. The surgeon favors extirpation of most of the gland, while the internist favors treatment. The latter claims that unless there is some mechanical pressure, or unless you deal with an emergency condition such as a toxicosis, surgery is uncalled for. Some of the x ray specialists, on the other hand, have claimed many successes in thyroid therapy ad lean to the use of the x ray because this agent has, in their opinion, certain advantages. The patient is not hospitalized; drugs are unnecessary; yet the symptoms are abated and the gland is reduced in size.

I believe that in a suspicious thyroid case, no suggestions of treatment should be made until the basal metabolic rate has been taken. A basal metabolism today if done properly is about the only guide, in my estimation, as to what course of treatment should be pursued.

If a patient, in spite of an apparent enlargement of the neck, has a basal metabolism of not more than ten or fifteen plus, or not less than ten or fifteen minus, it may be assumed that that patient does not suffer from any thyroid trouble, but is probably going through some physiological change or has an infection of the tonsils or nose or nasopharynx. Such a patient probably requires no more than sunshine and fresh air, correct food and proper guidance in life.

These conditions are referred to usually as the simple goiters or the strumas or the simple adenomas. If the patient has a basal metabolism of just above ten or fifteen or even normal, has a marked tachycardia, let us say a pulse of about 100, and that patient also suffers from time to time from headaches, nervousness, restlessness, and insomnia, you are dealing with a condition of adenoma plus some hyperthyroidism which is not yet a toxic goiter or a Basedow's disease.

I believe a condition like that requires purely medical attention, and not surgical nor physical therapeutics.

A basal metabolism of probably sixty or seventy, or even ninety plus, with a marked tachycardia, a tremor, a dermographia, indicate quite definitely that a toxic goiter is present. If there is some mechanical pressure, surgery alone will suffice. However, if there is an enlargement which does not produce pressure and there is no disturbance of the heart action, x ray or organotherapy should be instituted to bring about the proper metabolic function.

There is danger in the use of the x ray in the treatment of goiter, particularly of the toxic type, unless you control it by means of frequent basal metabolic tests. If the basal metabolism goes below ten and stays there, an atrophic condition of the thyroid may be suspected, either one lobe or the other, with a bordering hypothyroidism. This is considerbly more difficult to handle than a hyperthyroidism. Hypothyroidism due to x ray, over-medication, thyroidectomy, serums, surgery more than anything else, is not uncommon and calls for serious consideration. Instead of a hypermetabolism, these patients develop a hypometabolism, and with the syndrome of the voice changes, obesity, languor, apathy, a pituitary syndrome with it very similar to the Frohlich syndrome. Sometimes one notes also a trismus which is very hard to handle.

From the thyroid one could easily emerge if the endemic type of goiter did not have to be considered. While in reality this type of goiter is supposedly of frequent occurrence in certain regions, and attributed to iodine deficiency, many cases do not adhere to this etiology. Some cases present a decided symptomatology of hyperthyroidism at one time, and a hypothyroidism at another. A differential diagnosis is quite difficult. The condition is merely one of a neurotic state during which the thyroid will eventually present the picture of a toxic goiter. There may actually be a beginning of a toxic goiter with the result that frequent checking up with the basal metabolism test is an indispensable aid in the final diagnosis.

THE GONADS

You are no doubt acquainted with the work of Holzknecht, who tried to imitate Steinach's work in Vienna, in rejuvenating the female sex by using the x ray on one side and thereby stimulating the other side.

In the field of endocrinology this would have to remain absolutely empirical. Stimulation is secured when indicated, and likewise depression is produced when depression is needed.

The ovarian region frequently will present a complex symptomatology. The patient will complain of some dysmenorrhea or some irregularity of menstruation. Upon examination one finds that it is due merely to a nervous condi-

tion. The question is, what can be done for a case of this sort.

In such ovarian disturbances one is dealing with a combination of the entire endocrine chain. There is no one gland that is involved. It is usually, a pluriglandular involvement, with a calcium instability, very frequently a thyroid instability. We must find the specific treatment which would be, say, ovarian extract or corpus luteum, as the case might be. A great deal of benefit can be given the patient by hydrotherapy, massage and proper dietetic measures.

Since I have mentioned hydrotherapy and massage for the first time, I cannot dismiss this question without lamenting one fact in common with the physiotherapists, that is the great advance of the reduction cures. We who have been following endocrinology have suffered from no subject more than we have from the question of reducing obese people. They have had patent medicines and combinations and compounds, all of them, invariably, of thyroid extract in some dose or another. Thyroid extract is extremely dangerous. I don't have to emphasize that; you all know it. But the doctors who administer it are either ignorant of the fact or oblivious to the dangers. It is given very freely; it is used very promiscuously.

I believe since this subject is one of popular applause, and since it will absolutely appeal to the laity at all times, this Association ought to form a committee, the business of which should be very similar to that committee on endocrinology, to inform the public on the use of any apparatus that is extremely harmful, because anything that produces massive reduction invariably attacks the heart and influences the thyroid gland.

DISCUSSION

Dr. A. R. Hollender (Chicago): I am quite sure that we all enjoyed this very splendid talk by Dr. Kern for various reasons. First of all, it is a distinct diversion from exclusive physiotherapy, talks about which we have been hearing now for several days; secondly, it has suggested the opening of a new avenue of thought in connection with physiotherapy; and, thirdly, this talk has given us a great deal of information that may help to broaden our views along the combined lines of endocrinology and physiotherapy.

I wish to stress in particular one important point, and that is that endocrinology and physiotherapy are borderline subjects, and that any one who proposes to do physiotherapy, especially in the application of quartz light for metabolic disturbances, must familiarize himself at least to a degree of adequate information with the facts that are known today in connection with endocrinology. Endocrinology, then, and physiotherapy are closely allied. They are so-called borderline subjects. It is for that reason that an effort was made here, somewhat different from the aims heretofore, in planning the program, to have a talk on this subject and to bring before the College the possibilities in the so-called inter-related subjects.

Dr. Kern told you that he does not know very much about physiotherapy. You can take it from me he has not any lamps or machines, but he makes it his business to acquire all the information possible on these subjects, with the result that he knows a great deal about them. That is why he covered this field so admirably.

Dr. A. F. Tyler (Omaha, Nebr.): I am primarily a radiologist, having had most of my training in that field. Early in my experience as a radiologist I began using x ray and radium in the treatment of toxic thyroids and toxic adenomas of the thyroid, so that I should like to discuss that phase of Dr. Kern's remarks for just a moment.

I will preface my discussion by saying that I am heartily in accord with Dr. Kern in the fact that when we are treating thyroid with radiation we must check our results very carefully by metabolic estimation both before giving treatment and during treatment, so that we may know how far to go with the reduction of the toxicity.

In 1920 at the Washington meeting of the American Roentgen Ray Society, I read a paper which summarized my experience up to that date. In that paper I made the remark that toxic adenomas of the thyroid in our experience had responded more quickly to radiation than the toxic thyroids proper.

In this type of case, therefore, we run a greater danger in changing a hyperthyroid of the adenomatous type to a hypothyroid than we do in the extremely toxic case.

In that discussion I reported several cases in which the metabolic estimation made after treatment had shown a hypothyroidism. In practically every case, however, the treatment having been stopped, the metabolic rate gradually returned to normal limits, and in no case did I have signs of permanent hypothyroidism.

In treating the toxic thyroid, the results are slow, and in my opinion they must be combined with rest and other medical regime as well as radiation, because those cases are usually extreme when they come to us for treatment. If we accomplish results in the toxic thyroid by radiation within three to six months, I think that is about as much as we can expect to do. Because of that fact I am not as enthusiastic about treating the extremely toxic thyroid cases by radiation as I was earlier in my experience.

Another thing that has deterred me from treating the toxic thyroids with radiation is the fact that because of the extremely long period of treatment necessary we have to give during the entire course of treatment a considerable dosage of radiation, and six to nine months or a year after the discontinuance of radiation the patient is nearly always returning to us and asking what the red marks on the neck mean. That is, we practically always get a talengiectasis following long courses of radiation. Because of the location of the thyroid on the neck and because of the fact that most of the cases are in women, this becomes a serious post-treatment result. Consequently I am now using only minimal amounts of radiation in treating toxic thyroid.

Dr. E. B. Kessler (St. Joseph, Mo.): I am very much interested in endocrinology in conjunction with physiotherapy, and I want to go Dr. Hollender one better when he says they are borderline therapies. I should like to give the impression that they are overlapping therapies.

We know that today those who are using ultra volet light are doing something to the endocrine system. We may not know what we are doing, but the fact remains that we are doing something, and there remains a great deal of research work to be done along this line to find out what we are doing to the endocrine system by ultra violet light. Those who have treated any cases of eczema will appreciate the fact that we are doing a great deal with our ultra violet light that might be accomplished by thyroid extract.

We also should emphasize the fact that our treatment of the thyroid by x ray sometimes gives us some of the results that Dr. Kern has mentioned that are not very good for the profession. I might say that some doctors today are treating tonsils with the x ray and not taking into consideration the effect they are having on the thyroid and the parathyroid gland in so doing.

I am quite sure we have all seen the promiscuous use of reducing agents that generally contain the thyroid extract. We have had patients come to our office with a tremor and with an upset digestive system and with a very bad heart, and have found that for the past two to three weeks they have been taking some reducing treatment which no doubt contained thyroid extract.

In regard to our treatment of our calcium deficiencies, I have used the parathyroid very extensively, and I don't believe that I could do without the endocrinology part of our treatment.

I should like to ask Dr. Kern what his experience has been with spleen extract in these calcium deficiencies.

Dr. Chas. E. Stewart (Battle Creek, Mich.): I am very glad indeed to have the opportunity of listening to Dr. Kern's valuable presentation of this subject. I am sure that it is one that is very appropriate before such a body as this.

I want to emphasize, as has been done on a number of occasions before this body, the necessity of a very accurate diagnosis in these cases. I don't think there is any other subject that the internist has to deal with in which it is more necessary to study carefully into the symptomatology of the cases than in connection with endocrinology. This is a comparatively new subject, and I believe it is a subject or a branch of medicine in which physical therapy will play a very important part in the treatment.

First of all, in applying any form of physical therapy, let us remember that we are not treating the disease, we are treating the patient.

The doctor mentioned the use of hydrotherapy and mechanotherapy. There are endocrine cases in which hydrotherapy may do a great deal of harm; there are, however, a great many obese cases in which both hydrotherapy and mechanotherapy can be used to great advantage.

I just want to emphasize once more that before we can apply any form of therapy successfully we must first of all make an accurate diagnosis and know something with reference to the results of the methods that we are using in the curative process.

Dr. Kern (closing): With reference to Dr. Tyler's remarks, I want to say that I am acquainted with Dr. Tyler's work. I would say that the question as to why you can use x ray in toxic adenomas much better than actual exophthalmic goiter reverts to this, that the con-

tention is, in a toxic adenoma we really do not have any pathology, but we really have a great amount of colloid substance. Colloid is more active to the x ray and to other rays, whereas in the toxic goiter we have an actual degeneration of cells and actual pathology. It is pretty hard to take degenerated cells and reconstruct them. For that reason alone I believe the x ray could not be as efficiently used as in the other cases of goiter, plus the fact that there is a general pathology which you will admit, it would take about six months to correct.

Dr. Kessler asked a question about spleen extract. I would say while I am not trying to be ultra scientific in my use of organotherapeutic extracts, I absolutely do away with using any glands that are strictly empirical. The spleen extract is empirical in its action, but there is a great possibility that spleen extract will also raise the calcium metabolism. The reason for that is that the action of the glands of internal secretions has, among other things, a hormone nature; it starts up in a hormone manner the proper action of all the glands, and, therefore, it is not at all strange to see that you give a person, say, ovarian extract and all of a sudden their thyroid gland will go down, or in a case of amenorrhea you give thyroid extract and they will begin to menstruate very properly. Therefore, it is not a mistake to say that if we can't get proper parathyroid we could use thyroid, and if we can't use thyroid use anything, even spleen extract.

PRESENT STATUS OF TREATMENT OF INFECTIOUS ARTHRITIS*

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The fact that those afflicted with arthritis form a large percentage of the patients visiting the general practitioner, as compared with those suffering from any other single ailment, makes a paper on this subject timely.

To take up the classification of the different kinds of arthritis and give you the many details of suggested treatment would consume volumes. It is therefore necessary for me to limit this paper as far as possible by discussing only *infectious arthritis* and its accepted treatment.

This treatment can well be divided into prophylactic, stimulative, mechanical, medical, physical, and surgical.

PROPHYLACTIC

The present generation is spending just as much energy in developing preventitive medicine as it is curative medicine. The value of it needs no further comment. Many school clinics are doing a great deal of good by suggesting care of bad teeth, tonsils and adenoids. I believe that many sinus infections have their origin during childhood when their drainage is blocked as a result of the general hyperplasia which accompanies adenoids. Children who are underweight are ferreted out and medical attention advised. They are being taught the value of exercise which is so important all through life in aiding metabolism and elimination.

When arthritis has developed, it is essential, unless the condition is too acute, to locate the focus of infection. This we find in a very large percentage of cases to be in the teeth or tonsils. A full mouth x ray of all teeth should be taken and all infected teeth removed. Whether or not all devitalized teeth should be removed, as is advocated by Dr. Weston Price of Cleveland, even though they do not show a surrounding zone of infection, is still being debated. Until this controversy is settled, I believe a semi-conservative plan is the better one to follow. Remove all teeth around which there is definite x ray evidence of pathology. Remove all other possible foci of infection, and then, if after sufficient lapse of time the patient does not improve, I advocate the removal of all devitalized teeth.

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You will be surprised how many times improvement finally follows this last procedure.

How are we to rule out tonsil infection? We often times refer a patient to an otololaryngologist and have a report rendered that the tonsils are not affected. By this he means presumably that they are not unusually large, that no pus can be expressed from the crypts, and that there is no redness around the pillars, that the draining lymph glands are not enlarged and that there is no history of tonsilitis. While the above findings are clinical evidence of infected tonsils, we must, however, realize that the small tonsil which looks so innocent, is often small because it has been repeatedly assaulted and contracted by scar tissue. Much too often crypts have been cut off and isolated in this manner leaving only absorption into the lymphatics and blood stream as a means of drainage. Again, the tonsil which we consider normal in size and which manifests none of the above indications of disease, may be hiding infection. Only recently a leading otologist of my city brought in a tonsil to my laboratory, showing me a large walled off abscess just in front of the posterior capsule. He had repeatedly pronounced the tonsils of this patient negative, and only removed them as a last resort in an attempt to give the patient relief. I feel the conclusions reached by Drs. Lillie and Lyons (1) and published about two years ago, should be universally adopted, and for that reason I am going to quote you their summary which follows their discussion of after results in 200 cases of consecutive tonsillectomies for arthritis and myositis.

"1. It is justifiable to advise a tonsillectomy in every frank case of myositis or arthritis.

2. A marked improvement may be assured from tonsillectomy alone in 79 per cent of all cases.

3. It is necessary to remove all possibility of dental sepsis: by so doing a large percentage of patients will be improved.

4. The duration of the myositis or arthritis is a factor in the ultimate results, although benefit and even complete cure is obtained in some long standing, chronic cases.

5. Forty-five per cent of the patients with chronic myositis or arthritis who are invalids will respond favorably to tonsillectomy.

6. The size of a tonsil has no bearing on its possibility as a focus of infection. A careful expression of the tonsillar crypts and a history of throat trouble associated or not associated with the myositis or arthritis is essential in the diagnosis.

7. An absence of a history of diseased tonsils in no way eliminates the organ as a focus of infection.

8. A clean tonsillectomy, with the removal of the plica tonsillaris is necessary in every case."

The sinuses are not so deceptive as are the teeth and tonsils. Frequent "head colds," headaches, facial neuralgias or nasal discharge will suggest trouble in this region, but it remains for a properly taken radiogram to reveal the extent of the infectious process. An occluded or partially occluded sinus is fully as dangerous as is an infected tooth or tonsil. Its proper treatment requires a greater degree of skill.

Latent infection in the gall bladder, appendix, prostate or fallopian tubes must be ruled out and eliminated if found. The prostate especially is too frequently overlooked in searching for foci of infection. Stasis in some part of the intestinal tract, especially the ascending colon, must be looked for. That it plays an important role must be beyond question, when we personally recall experiences of fatigue, la grippe, malaise from autointoxication of constipation. Twinch (2) believes that the colon as an infectious organ, causes more infections in bones and joints than all other infective foci combined.

STIMULATIVE

Nature has provided our bodies with a wonderful army of antibodies which are ready to go forth in battle after battle against our invaders. Sometimes, however, the sentinel does not sound the alarm loud enough, and they lie dormant. Many times vaccine is all that is needed to start their activity. The necessity should always be provided for when possible by obtaining a culture from infected foci when they are removed or treated, since autogenous vaccine has proven to be more effective than the stock vaccine. Burbank (3) advises a determination of the complementary value of the blood as an index to its bactericidal capacity. In line with vaccine treatment the brilliant results tabulated by Paul (4), who reports the results of treatig 600 cases of rheumatism by cutaneous vaccination, should be considered.

Protein shock therapy is worthy form of treatment in many cases. The intravenous injection of Wittes peptone or milk, so as to produce a relatively severe reaction often times stimulates anti-body formation when other methods fail. Rolleston (5) refers to Cruickshank's method of injecting 0.3 to 0.6 grain of peptone in solution intramuscularly. This is given on four or five occasions at weekly intervals. A temperature of 101° F. usually follows.

Unfiltered sunshine is one of the cheapest and yet efficient stimulants, but unavailable to the vast hordes of people dwelling in the valleys and on the plains. Fortunately its most active agent—ultra violet rays—can now be obtained from the mercury quartz lamps. Exposures to ultra violet rays will raise the hemoglobin content of the blood; it makes calcium available for metabolism and seems to stabilize metabolism. For those patients whose resistance is low and whose general condition is not good, we have no better form of treatment.

MECHANICAL

During the acute stage, all affected joints should be put to rest, otherwise the irritation of motion increases the inflammation and is apt to increase the amount of destruction. Position of rest is vital. Deformities, the bugbear of infectious arthritis, must be prevented if possible. They are best prevented by early recognition of their insidious onset and the application of splints which will at least hold the part in a useful position. Rest in bed, splints, canvas belts, plaster casts and traction all have their place in maintaining position, immobilization and relief from pain.

MEDICAL

Under this heading, I consider elimination the most important. Elimination not only from the body as a whole but also from the affected part. Fluids should be pushed. Not less than 3000 cc. of fluid should be taken in 24 hours. The bowels should be kept free. A small dose of mineral water or epsom salts taken each morning when the patient gets up is very satisfactory. Some physicians prefer mineral oil. Be that as it may, the important point to remember is that the colon may be the focus of infection, and must be respected accordingly. Twinch (2) advocates passing a colon tube high into the bowel and flushing the colon every day for three or four weeks. Perhaps this sounds like a very drastic form of treatment, but it emphasizes the importance of not neglecting the large bowel.

The diet should be simple and well balanced. Excesses should be avoided. If constipation is present, then the individual should receive a good percentage of vegetables and be taught the value of regularity. By that I do not mean a bowel movement once a day, but a bowel movement at a certain time each day.

There is no specific medication. Salicylates, cincophan, thyroid extract, arsenic, parathyroid, iodine, collosol, preparations of sulphur and ganese and many other medicines have their advocates. Young and Youmans (6) report very favorable result by the intravenous injection of O-Iodoxybenzoic acid into 43 cases.

Monoghan and Garai (7) report equally favorable results from intravenous injection of activated colloidal sulphur. Perhaps some specific medication will sometime be discovered. We all hope so, but in the meantime all medication must necessarily be used symptomatically.

PHYSICAL

Under this form of treatment we have a large and somewhat diversified choice; hydrotherapy, electrical baths, mud baths, sulphur vapor baths, hot packs, massages, mechano-therapy appliances, etc.; all are available and each will do a lot toward aiding elimination and stimulating a better circulation to the affected part. But unfortunately these appliances can all be had in only a large hospital, sanatoria or specially equipped clinic. Many patients for either financial or business reasons are unable to submit to care in such institutions or clinics, unless located at home, and so must receive either home or office treatment. Fortunately two methods of physiotherapy have been introduced within the last ten years, which are even more useful than the appliances and methods above described, diathermy and indirect diathermy.

Diathermy is heat, and heat has been used since the very beginning of medicine. Convective heat such as is obtained from electric pads, hot water bottles, etc., are very good for applying heat to a surface, but penetration is not obtained because of the constant dissemination by the blood. Arthritis is an inflammation of joints and therefore must necessarily be classified as deep seated pathology. Direct diathermy produces heat within as well as on the surface by the resistance of the tissues to the electric current. This heat produces a relaxation of muscles and therefore affects the arteries more than the veins. Blood supply becomes greater resulting in more lymph drainage, better absorption, increased metabolism, active phagocytosis as well as an increase in the number of phagocytes and a soothing relief from pain. To obtain the best results it is very necessary to apply the electrodes in such a way that the path of the electric current between them will pass through the part affected. This method of treatment applies to all chronic arthritides, either of infectious, toxic or traumatic origin, but it is contra indicated in all acute infectious conditions with the possible exception of gonorrhea. In acute gonorrheal arthritis and orchitis, I have witnessed marvelous results from just a few treatments even after the condition had persistently failed to yield to all other methods. Success in this class is undoubtedly due to the higher susceptibility of the gonococcus than of the body tissues to heat.

Indirect diathermy, or autocondensation consists in the rapid charge and discharge of the body. Every body cell receives its charge and discharge. In so doing the molecules of that cell are activated and its metabolism is increased. As the process continues, a general warmth over the entire body is created, blood supply is increased to all parts, lymph drainage is hastened and elimination of toxins and other by-products are speeded up in their exit through the skin and kidneys. It has been my personal experience to obtain even more benefit from this form of diathermy than from the direct. Metabolic processes as a whole are increased rather than only in a local area. Poisonous by-products, the cause of many arthritides, are hastened in their exit from the body and so we are getting rid of the exciting factor.

SURGICAL

When pain persists after all other forms of treatment have been tried in the chronic arthritides, it is sometimes necessary to resort to surgery. Joints may be resected or immobilized. The spine is immobilized by splinting the spinous processes. Smith (8) advocates a resection of the ascending colon when it has lost its tonicity and the bowel shows a large increase in gram-positive bacteria. In the acute purulent conditions, Willems and Cohn (9) advise incision of the joint capsule as soon as pus is found to be present; use no drainage tubes; immediate ac-

tive mobilization, and weight bearing as soon as the patient's temperature is less than 100. Phemister (10) believes in early drainage and extension of the joint when possible. According to him, mobilization should be started only after the peak of the acute infection has been passed, and extension should be continued along with it until general symptoms have partially subsided, the discharge has become slight and has lost its purulent nature. He maintains and shows films proving that pressure too early increases destruction. Blake (11) warns against opening the joint capsule before there is evidence of destruction, and advocates repeated aspiration and dilution with normal salt solution. After destruction has started, his treatment is virtually the same as that of Phemister's.

In conclusion, I believe the physician should protect himself by warning the patient that,

(1) The treatment may be prolonged;

(2) The condition is very apt to get worse without treatment.

(3) Symptoms may increase temporarily after removing the offending foci.

(4) Deformities may develop in some cases even with the best of care.

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DISCUSSION

DR. J. E. G. WADDINGTON: In diathermy, the heat, of course, is greater toward the center, that is, where the most resistance is. If you have an arthritis, you don't want to heat the bone, there is no vascularity there; you don't want to heat the synovia, that isn't going to do any particular good. What you want to do is get around the periarticular tissues, and in that case you can use diathermy if you wish; there is no law against it. You would think more of using it in a modified form, that is, from a uniterminal high frequency current. Or you would employ a deep therapy lamp to heat up the tissues.

I am not talking about bony ankylosis where we have a fibrous deposit, impeding circulation and impeding locomotion and use of the joint. Many men stress diathermy for heat and so on. I am going to stress galvanism, not because I am a faddist for galvanism, but simply because the thing is indicated, and galvanism is indicated in the arthritic condition, far more than the much advocated diathermy. In these fibrous conditions you want to absorb fibrous tissues, microscopic very likely and sometimes macroscopic. It can be done with the negative pole because the scar tissue is very superficial.

Some time ago I had the opportunity of spending a whole day with the father of ionization. It isn't what you put on the pad that is going to do good, particularly as far as any work goes in regard to dissolving scar tissue or any other effect that takes place in the tissues. Any chemical, no matter what the nature, would simply act as a lowering of the resistance of the skin and allow the galvanic current, a low voltage current, to go to its best resistance irrespective of what current you put on, whether you use salts or potassium iodid, which the French use a great deal and for no particular reason that I can find out. They use anything that will be an ion, any chemical that will cut

down the resistance of the skin. We believe that chlorine has a little action. It is the negative pole that is bringing more blood to those parts that causes this absorption of tissue in these arthritic conditions in which we have so much fibroses.

Dr. E. S. Simmonds (Cincinnati, Ohio): What is the mode of application

Dr. Waddington: If you are using salt, and most people do, and it is a good thing to use sodium chloride because it cuts down the resistance of the skin, don't moisten your thick pad. Whatever the pad may be, whether cotton or sponges or asbestos, don't put that in the salt solution, because it is hard to get out. If you keep on using the pads from day to day, you will find the crystals of salt will accumulate. If you use potassium iodi, you simply waste a lot of chemical. Use your ordinary pads, of course, but apply your ionizing solution such as sodium chloride by what I call ionizing pads, which are simply made of crash linen. Make a small pad and have it about half an inch or a quarter of an inch thick, according to how big your other pad is. Make it of crash linen or cotton. Soak it in ionizing solution. Then you have a larger pad, the ordinary pad that connects to your galvanic current. Here is your ionizing pad made out of crash toweling or crash linen, because it is hygroscopic, not very thick, not to exceed a quarter of an inch or an eighth of an inch. This is simply linen with no metal back of it at all. Then you have your ordinary pad from which you apply the negative galvanism. This sets in and goes up against the joint. That is the way you apply your ionizng solution to any part of the body. Have the ionizing pad a little smaller, simply so as not to concentrate on the edges. If you get a concentration upon your chemical solution you will get more penetration on those edges than you want.

Dr. Turbin (Madison, Wis.): Dr. Johnston's paper interested me very much, as I have at the present time a lady patient whom I have been treating for over a year for arthritis and the tonsils have been removed, the teeth extracted, the appendix has been removed, the hemorrhoids have been operated upon, sinuses are clear, the blood tests are negative; in fact, nobody can find any focal infection in that body and still she has arthritis. The only modality which I can get benefit from is diathermy every day, complete diathermy, and actinic light one day and diathermy the next. I have gotten her in such a condition that she goes without pain and feels fine for about a month. Then she comes back and has to take treatments all over again. No one can find out where the focal infection is.

Dr. Benj. Chapman (Chicago): I had a patient, a woman, with arthritis of long duration for many years. The joint was opened twenty years ago in the old country. The patient is now in this country. I took an x ray plate of the joint. This showed a focal joint. I first applied diathermy in the case, but it didnt show results. I called a surgeon and the case was diagnosed as tuberculosis of the joint. The surgeon recommended a cast to put the joint at rest.

I would like to ask Dr. Johnston if he treats tuberculosis of joints with diathermy, or does he use only diathermy in arthritis.

I would like to speak about focal infection. I had a patient who had a neuritis in the shoulder joint, and I used different methods of treatment without results. At the same time the patient had an attack of gall bladder infection. I referred her to a surgeon, and he operated and the neuritis cleared up.

Dr. W. A. Johnston: In regard to Dr. Waddington's remarks about the treatment of arthritis, I agree with him very much in that in superficial jonts where the periarticular inflammation is not too deep, that some of the other modalities such as the deep therapy lamp, etc., give better results, but in the periarticular inflammations of the back for instance, we have the seat of infection too deep to be reached by any superficial method such as the deep therapy and other similar appliances.

Now, then, in regard to galvanism. I must admit I have never used galvanism in the treatment of arthritis. Undoubtedly it has its distinct value, as suggested by Dr. Waddington. I think that when I get a case that I am having a lot of trouble with I will try it.

In regard to your case, Dr. Turbin, may I suggest or ask whether the colon has been very definitely excluded.

Dr. Turbin: The colon has been flushed, but this lady has a general arthritis of the shoulders and hands and ankles, a complete arthritis.

Dr. W. A. Johnston: We all get that type of case. I think one of the most striking results I had in my whole experience was a patient who had been in quite a distant city and had doctored at many different places and every one had given her up. She finally came back home to spend the rest of her life with the usual deformities; not only her fingers and arms, but her legs and back were deformed. She really was a hopeless looking cripple. Ultra violet was applied to this patient every day; autocondensation was applied every day, and then the usual medical regime was used. I think the treatment lasted something like seven months, but the results were wonderful and that woman has been doing her work for two years the same as she did before fortunately, without any recurrence. The foci had all been run down as far as possible.

Now as to the use of diathermy in tuberculosis of the joint. I personally do not use diathermy in tuberculosis of the joints. I believe the medical form of treatment and ultra violet and rest will accomplish as much as will be accomplished by using diathermy in the treatment of tubercular joints.

Dr. Geo. B. Lake (North Chicago, Ill.): Mr. Chairman, before you go on to the next subject, I wish to state I hesitated to say anything until the physical therapy discussion of the subject of arthritis was closed. While you are on that subject, if any of you gentlemen who have not read the paper by Young and Youmans which appeared in a comparatively recent number of the Journal of the American Medical Association (I can't give you the date at this moment) on the use of O-Iodoxybenzoic acid intravenously in the treatment of old chronic arthritis, will do very well to look it up. Young and Youmans didn't claim they can do everything with that, but they do claim some old, very badly deformed, chronic cases of arthritis can be loosened up and put into shape so physical therapy and orthopedic surgery can do something for them. Those particularly interested in arthritis will do well to look up that paper of Young and Youmans, because it is most interesting.

DIATHERMY IN THE TREATMENT OF PNEUMONIA*

LLOYD M. OTIS, M. D.
CELINA, OHIO

The last three years we have seen a rather general acceptance of diathermy as one of our most valuable therapeutic agents in pneumonia.

If one will but analyse the effects of diathermy within the tissues when applied to the pathological processes taking place in pneumonia he will satisfy himself as to its possibilities.

Diathermy is a high frequency current adapted to generating heat within the tissues. In other words hyperemia can be produced in any part and to any depth desired.

When we recall that hyperaemia promotes a better circulation, hence increases phagocytes and enzymes, drains tissues of their congestion and stasis, which in turn relieves pressure (and the relief of pressure means subsidence of pain), then we can appreciate the effects of diathermy in pneumonic processes. As we recall that the body's defense to organisms is the bactericidal action of the enzymes produced by the phagocytes the increasing of circulation in and about the consolidated lung increases this enzyme action. The added heat stimulates this chemical response so indirectly, diathermy has a bactericidal effect whether it be by the chemical process or the high temperatures developed within the tissues. The real appreciation of this agent is not realized until one has actually observed the administration of diathermy to a pneumonia patient. The symptomatic relief, if no other, would be sufficient to warrant its application in nearly every case.

Shortly after the treatment is begun the physician sees his patient getting easier, his respiration is deeper, expiratory grunt is lessened, pain is relieved and free respiration is established. It is not infrequent to see a patient have his first sound sleep during or shortly after the first treatment.

The circulatory system is aided from the beginning and this is manifested by the conversion of a rapid or thready pulse to one of more volume and of slower rate. If any cyanosis was present this is readily cleared up.

Temperature is generally started on its downward curve from the beginning of treatment and continues to descend by lysis.

The response varies according to the stage diathermy is begun. When it is instituted at

*Read at fifth annual meeting, American College of Physical Therapy, Chicago, Oct. 22, 1926.

the incipiency of the disease, abortion of the symptoms is generally the rule. By this I mean the treatment must be started during lung congestion and prior to any hepatization. Treatment begun after hepatization will shorten its course, lessen its complications, make a comfortable patient and greatly lower the mortality.

The response is equally effective in all the four types of pneumonia. However, in streptococcic pneumonia, I have failed to obtain the satisfactory results that is seen in the regular four types.

Post-operative pneumonia generally clears up in twenty-four to forty-eight hours. This undoubtedly shows what can be done with all other early cases. The surgeon quickly seeks the cause of rapid rise in temperature, and the pneumonia, diagnosed early, is quickly aborted by diathermy administration. The application is without any danger. There are no complications to be anticipated from its use. The theory formerly held to avoid diathermy where there were possibilities of hemorrhage has long been exploded.

TECHNIQUE

The bipolar D'Arsonal current is used. Electrodes should be of block tin or German silver mesh corresponding in size to the area involved (generally 4 by 6 or 5 by 8 inches). The two electrodes are of approximate equal size. If there is any hair over the region to be treated it should first be shaved. The skin on the posterior part of the chest to be treated is covered with warm soap lather as is also the electrode. Apply electrode and see that it fits the skin firmly, placing under it a small pillow. Cord is attached by clamp or held in apposition to electrode by pressure. Patient is now placed on his back. Electrode is then placed on anterior part of chest and may be held on with hands or a light sand bag. If there is indentations between the ribs German silver mesh is better for the anterior electrode. See that the cords are firmly fastened as a burn will result if the tip of the cords are detached and come in contact with skin during treatment.

Start machine with spark gap practically closed and rheostat on first or second button. Take about five minutes in moving up rheostat and gap to about 1500 or 2000 m.a. At times it is best to use patient's tolerance. Some will only take 1400. If patient is delirious I would not advise over 1400 or 1500 m.a. After this amount is reached run treatment for about thirty-five or forty minutes, then gradually (taking about two or three minutes) turn down gap and rheostat. Treatments are given from twice daily to every six hours, depending upon severity of case. If at any time electrodes spark, shut off machine and relather.

CONCLUSIONS

Diathermy makes the pneumonic patient comfortable, lessens the effort of the circulatory system. Applied at the onset it aborts, later it shortens the course, and the mortality rate is reduced. It is a valuable adjuvant in pneumonia therapy.

EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

A Journal of Ideas and Ideals.

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Chicago, Illinois

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Sixth annual meeting American College of Physical Therapy and Clinical Congress on Physical Therapy—Hotel Sherman, Chicago, October 31 to November 5, 1927.

THE JOINT MID-YEAR SESSION AT WASHINGTON*

The joint session of the American Electrotherapeutic Association and the American College of Physical Therapy at Washington to be held immediately preceding the meeting of the American Medical Association is significant for a number of reasons.

Its program gives physicians from all parts of the country an opportunity to listen to timely and important presentations in the line of physical therapeutics by leaders in research work and by eminent clinicians in this field, and to exchange opinions thereon. While our parent organization, the American Medical Association, has shown its active interest by the creation of the Council on Physical Therapy, and is encouraging the presentation of physical therapeutic subjects in the various sections, such presentations, to an audience unfamiliar with the elementary principles of the subject and technique of the treatment, are quite unsatisfactory, and the subsequent discussion—if any—is usually flat. It is to be hoped that the character of the program and the size of the audience will demonstrate that the time is not far when a special section on physical therapy within the American Medical Association will fill a real need.

The joining of hands between the American Electrotherapeutic Association, the oldest physical therapy association in the world, and the American College of Physical Therapy, which, though much younger, has the largest membership of any physical therapeutic association in America, is also significant because it came about as a matter of course and with an exchange of only a single letter between its responsible committees. There was an equally cordial and ready response by all other regional

physical therapeutic associations that could be communicated with. Delegates and officers of the New England Association for Physical Therapeutics, the Western Physiotherapy Association, and the Mississippi Valley Physiotherapy Association, and last but not least, the Canadian Association of Electrophysiotherapy, are expected to attend the session and participate in its deliberations. A joint clinical session with the American Academy of Physiotherapy will be held at the Walter Reed Hospital. All of which demonstrates the earnest spirit of all these bodies and their willingness to unite for the good of the common cause. We trust that whatever resolutions will come out of the common deliberations, they will be for the best of all concerned.

The organized medical profession is the most important factor for the further scientific development and extended practical application of physical therapeutics in North America, and, in view of the foregoing, the future possibilities seem bright indeed.

*This editorial appears concurrently in Physical Therapeutics.

ANNOUNCING
JOINT SPRING MEETING

American Electrotherapeutic Association
and
American College of Physical Therapy

May 16th and 17th, 1927

CARLTON HOTEL, WASHINGTON, D. C.

The program includes interesting papers on electrothermic methods, radiant energy, x rays, galvanism, and therapeutic exercise.

The Monday afternoon session will be held in the laboratories of the U. S. Bureau of Standards devoted to x ray, ultra violet and high frequency currents.

Tuesday afternoon's clinical session will be conducted at the Walter Reed Hospital. This meeting is to be jointly with the American Academy of Physiotherapy.

FELLOWS OF THE A. M. A.

are invited to attend these sessions.

Programs can be obtained from either Richard Kovacs, 223 E. 68th street, New York City, or A. R. Hollender, M. D., 30 N. Michigan avenue, Chicago, or R. W. Fouts, M. D., Medical Arts Bldg., Omaha.

PROGRAM
JOINT MID-YEAR MEETING

OF THE AMERICAN ELECTROTHERAPEUTIC ASSOCIATION AND THE AMERICAN COLLEGE OF PHYSICAL THERAPY

Carlton Hotel, Washington, D. C.

May 16, 17, 1927

Monday Morning Session, May 16, 1927, at 9:00 a. m.—Symposium on Electrothermic Methods.

"Surgical Diathermy—Its Status in Cancer Therapy"—Gustav Kolischer, M. D., Chicago.

"Electrothermic Methods in Inoperaple Cancer of the Breast"—William H. Schmidt, M. D., Philadelphia.

"Management of Inoperable Cancer by Electrothermic Methods"—George Austin Wyeth, M. D., New York.

"Oxidation"—Prof. Albert J. Mathews, University of Cincinnati (by invitation).

"The Effects of Lower Frequencies of Radiant Energy on Some Forms of Germ Life"—William Benham Snow, M. D., New York.

Monday Afternoon Session, 2:00 p. m.—U. S. Bureau of Standards.

" X Ray Standardization"—F. L. Hunt, M. D., Washington, D. C. (by invitation).

"Sources and Methods of Measurement of Ultraviolet Radiation"—W. W. Coblentz, Ph. D., Washington, D. C.

"X Ray Treatment of Hypofunction of the Ovary"—I. Seth Hirsch, M. D., New York.

"Therapeutic Exercise"—J. C. Elsom, M. D., Madison, Wis.

The afternoon session will be concluded by a visit to the laboratories in the Bureau of Standards devoted to x ray, ultra violet, and high frequency currents. Department of Commerce.

Informal Discussion of Therapeutic Application.

Monday Evening Session, 8:00 p. m.—Banquet at the Carlton hotel. The cover charge is $5.00 by reservation. Checks should be sent to Dr. A. R. Hollender, 30 North Michigan Ave., Chicago. Address of the evening by Frank B. Granger, M. D., Boston.

"Physical Therapy in Europe" (lantern slides and moving pictures)—Richard Kovacs, M. D., New York.

TUESDAY

Tuesday Morning Session, May 17, 1927, 9:00 a. m.

"Adjuvant Action of Diathermy in Nasal Accessory Sinus Disease"—Frank J. Novak, Jr., M. D., Chicago.

"Application of Heat for the Relief of Pain and for Other Therapeutic Effects"—John Harvey Kellogg, M. D., Battle Creek.

"Observations on the Effects of Diathermy in Osteomyelitis"—Disraeli Kobak, M. D., Chicago.

"Peripheral Nerve Injuries, Treatment by Physical Methods"—John Stanley Coulter, M. D., Chicago.

"Physical Therapy in Redudant Colon (Hirschsprung's disease)"—Joseph N. Chausse, M. D., Montreal.

"Case Presentations, Filariasis"—Charles F. Stokes, M. D., New York.

Tuesday Afternoon Session, 2:00 p. m.—Walter Reed Hospital.

Joint session with the American Academy of Physiotherapy.

Visit to the Physiotherapy Department and clinical demonstrations.

SUNLIGHT AND ULTRA VIOLET RADIATION

An interesting editorial appeared in the January issue of Surgery, Gynecology and Obstetrics under this caption. It was written by Charles Sheard. This sort of writing is indeed timely and should be commended. In a short space the writer has vividly portrayed some of the salient features in connection with the properties of sunlight and its substitute, ultra violet radiation as obtained artificially by means of carbon arc and mercury quartz lamps.

"Most plants and animals, including man, are as dependent for normal growth and development on the short wave lengths of sunlight, known as the ultra violet rays, as they are on heat energy which, in a large measure, lies in the infra red radiations of sunlight." This is a pertinent statement which means much. It is expressed in a single sentence and yet considerable intensive research on animals was necessary to have the results accepted as sound evidence.

The results of the practical application of ultra violet radiations to man was even more convincing proof than those secured in animal experimentation. The noteworthy work of Huldschinsky, Hess and others in curing rickets at once demonstrated the value of artificial ultra violet energy, although of course, sunlight has for decades past served in this role.

Many workers have aimed to prove the need of ultra violet energy for the maintenance of health. The thought has never been definitely

accepted as true. And while conclusive evidence based on laboratory or clinical investigation is not at hand to prove or disprove what may yet be considered an assumption, this view seems to be gaining greater and greater favor.

Thus Sheard writes, "Apparently, also, in the absence of ultra violet rays, the body is more susceptible to the inroads of disease. It is quite definitely proved that there is a marked tendency to anemia in many of those who live indoors a considerable portion of the winter months; with this condition, therefore, and with lack of exercise, fresh air and controlled diet, it is entirely possible that influenza, grip, and ordinary colds may hold sway."

Unfortunately the true effects of ultra violet radiation are not definitely known, and, in fact the point of perfection in its mode of application has not been approached. Progress is destined to be more rapid from now on in view of the fact that clinicians are clamoring for more information on the subject. This, in order to handle the problem more intelligently. To Sonne, Leonard Hill, Gauvain and their associates, among many others, we owe a great deal for the enlightenment which we now possess, for they have endeavored to rationalize the application of ultra violet energy by careful laboratory and clinical tests.

The "wild scramble" for quartz lamps during the past two or three years simply indicates the modern tendency of physicians in their realization of the value of ultra violet energy in therapy. This tendency to be true has been an overenthusiastic one. Like many other new therapeutic aids, it is being put to the test. If applied cautiously and scientifically, the results will not be disappointing. If, however, the unusual and the impossible are expected of it, failure will follow. Overenthusiasm is not particularly contraindicated, for in this case, it is aiding in bringing forward something which should have occupied a place in therapy many decades ago. But, lest we become overzealous in our desire to make a cure-all of it, let us proceed more slowly from now on in order that the sequence of proof and claim be proper. A. R. H.

PLACING PHYSICAL THERAPY IN THE PRACTICE OF MEDICINE*

The story is told about an Englishman who was about to change his residence and who had among his household belongings a grandfather clock, of which he was very proud. On moving day he did not wish to trust the clock to the care of the men in charge of the van. So he decided to shoulder the clock and carry it the few blocks to his new home. He had not gone far when he became very tired and exceedingly warm. Just as he was setting the clock on the sidewalk he was met by a gentleman who remarked: "I say, old chap, why don't you carry a watch?"

In the practice of medicine today we are encumbered with medical procedures still held in high regard, but for modern practical purposes are almost as unwieldy as a grandfather clock.

It is not my purpose to recall much of the history of physical therapy for it is now only necessary to peruse medical literature to become acquainted with it. However, I do wish to correct the prevailing idea that the legitimate place of the advent of physical therapy seems to date from the World War. As a matter of fact it existed long before that time and was only brought to the forefront by peculiar clinical advantages through military exigencies and the disabling injuries and illnesses accompanying the gigantic conflict.

Physical therapy should be interpreted as any non-medical means of treatment, and this includes physical, chemical, heat, light, water, electricity, massage, physical exercise; the use of a single agent or a combination of several of

*Read at annual meeting of Iowa Physiotherapy Association, Des Moines, Nov. 11, 1926.

them. It is to study these various means that we have met together and why we are trying to settle all questions pertaining to the use of physical therapy. We are trying to determine what are proven methods. And in this it is our purpose to be absolutely fair, giving credit to the just use of the adjuvants and filtering out all that is uncommendable.

There is no such thing as a physical therapist, *per se*... Every physician should use physical means in his practice. Every physician knows that it is necessary to make the diagnosis of the case first before any treatment is instituted. There is no such thing as turning on a machine, any machine, and expecting improvement of the patient simply from the fact that physical therapy is used. It is necessary to know what are the proven points in the use of any physical agent to restore health. All are impressed with the fact that the use of physical apparatus means the call for the utmost accuracy at every step.

We all know that there have been unfounded claims. There have been bad habits and some quackery. Happily, many of these are being eliminated through the medium of such associations as this and we are to be commended upon this attainment and, I may add without apology that, physical therapy has not presented as many unfounded claims as can be found in other so-called remediacl agencies for human ills. The ancestry of medicine does not give us much to be proud of, in many instances.

Just what is meant by physical therapy can best be explained by reviewing the list of measures used. The following are those approved by the Council on Physical Therapy of the American Medical Association:

1. Heat, Natural and Artificial—Diathermy, hot dry packs, hot water bottles, electric pads, and the combination of heat with light and of heat with hydrotherapy.

2. Hydrotherapy—Hot and cold packs, hot and cold douches, whirlpool baths, swimming pools.

3. Heliotherapy or sunlight, artificial light, as that from a mercury quartz lamp, air or water-cooled, a carbon or modified carbon arc lamp, and an incandescent lamp; gamma rays of radium; roentgen rays.

4. Electricity—Galvanic, faradic, and sinusoidal currents, static electricity, ionization and combinations of these.

5. Massage—Manual percussion, stroking, sedative type, brisk kneading type, manipulative as in stretching, pulling, and corrective manipulations.

6. Therapeutic Exercises—Muscle training exercises, passive and active, mechanotherapy, occupational therapy, games.

The above catalogue presents a variety of agents from which to choose for application to a given case. Rarely is one agent sufficient to give the desired clinical results; but, rather, there should be selected combinations in certain pathologic conditions, together with indicated medicinal or surgical procedures. Such use of physical therapy places it in the practice of medicine where it can be controlled. This rids us of dreaded accusations of empiricism, which can be dispelled only by a careful study of physics, physiology and biochemistry. The physician then becomes especially trained and by that training has learned to accurately recognize those cases best suited to the use of physical measures, which are when thus made, as they really are, a component part of medicine.

These meetings have been organized by and are intended to instruct practicians of medicine in the physics of various pieces of apparatus, that they may learn all the properties, methods of control and application, and the clinical advantages. As a result of all this research and instruction, substantiated by gratifying clinical

results, the desire for this knowledge has spread throughout a surprising percentage of the medical profession until it is now sought even in the medical schools. And this is as it should be.

But there are certain problems to be overcome, which only time can solve. It has been suggested that certain teaching methods and formations of curricula can well be put into effect at once for the advantage of the present medical student. There is no question but that there should be more intensive and prolonged courses of instruction. Such courses are being formulated by recognized authorities on physical therapy, so that ere long there will be available definite requirements for standardized proficiency in a graduate.

As I see the present situation from having followed it two decades, there has been nothing so prominent in the process of eradicating the long evident tendency in medical education toward graduating expert technicians instead of all around practicians of medicine than the inauguration of the combination of physical therapy with medicine in all its branches. Physical therapy demanded its place to the extent that there had to be cast a melting pot, wherein the triad of medicine, surgery and physical therapy could be blended.

This has had some striking results. One of the foremost has been the elimination of the often sharply defined line between the prescriber of medicines, the surgeon and the physical therapist. The all around physician became a combination of the three. And by the all around physician I mean such as you, whose foresight has enabled you to equip yourselves with the modern instruction and armanentarium. You are the proof of what can be accomplished when everything is properly balanced.

The specialties, on the other hand, are enhanced because of the fact that each is striving in research and instruction toward definite specialized applicability.

Thus we are coming to a happy solution of what was to the medical profession a very cumbersome situation. Like the Englishman with his clock we were seeming to carry a topheavy load, when as a matter of fact it was better to recognize it as similar to a watch with all its delicacy and accuracy.

LYNNE B. GREENE, M. D.
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THE STUDENT'S LIBRARY

BOOKS REVIEWED

THE PRCTICE OF MEDICINE. Second edition. By *A. A. Stevens*, A. M., M. D., Professor of Applied Therapeutics in the University of Pennsylvania. Philadelphia: W. B. Saunders Co., 1926. Pp. 1174.

This book is in its second edition only four years after publication. The volume is replete with references to the writings of many authorities. Dr. Stevens' extensive experience is noteworthy in several instances and shows an independence of thought which can be displayed only by maturity in a medical specialty. In the new material which has been added attention is directed to the work of Dick on scarlet fever. MacCallum's newer thoughts regarding the classification of the leukemias is also of interest in the additions and changes in this second edition. There are many other revised sections, which, in all, makes this text as modern as one would hope to find. The predominating feature is the expression of the author's viewpoint based on long years of experience in medical practice. There is valuable reading in a volume such as this for the student as well as the practitioner. In various parts the descriptions of diseases as well as the treatment give one a practical inside such as is frequently lacking in many texts on medicine which have appeared during the past decade.

INTERNATIONAL ABSTRACTS

Roentgen Rays Stimulating Doses of the Ovaries, Permanent and Temporary Sterilization. E. Pohle, Am. J. of Med. Sc., p: 91, Jan. 1927.

Pohle discusses the literature and reports ten cases as a basis of his work on this subject. He believes that permanent sterilization is indicated where future pregnancy is not possible or undesirable from a medical standpoint. In general, for permanent sterilization by x ray a greater percentage skin unit dose (S. U. D.) than in temporary sterilization is used. Small doses of roentgen rays or radium to the ovary are not recommended as a therapeutic measure, as this method is in the experimental stage. He believes that further study in this problem is needed, and publication in all such cases of the exact dose of treatment including the duration of the amenorrhea, later pregnancies, and all other necessary data. In his ten cases he met with uniform success in permanent or temporary sterilization.

A. J. KOBAK.

Changes in the Ovary of a Mouse Following Exposure to X Rays, Part I. (Irradiation at Three Weeks Old.) F. Bromell, A. Parkes and U. Fielding. Proc. of the Roy. Soc. 101: 29, Jan. 1927.

The authors exposed 47 female mice at three weeks old to a full sterility dose and found that irradiation caused degeneration of all the oocytes. The membrana granulosa and theca interna, where it was possible to differentiate them, likewise showed degenerative changes. In a few cases it was noted that the larger follicles became filled with blood and formed cysts; or, the cells of the theca interna and membrana granulosa invaded the follicle cavity and formed a corpus luteum atreticum, which persisted indefinitely, but ap-

peared to have no effect on the oestrous cycle. Simultaneously with these changes the old inter-follicular tissue atrophies and the germinal epithelium proliferates epithelial cords. In the adult animals the ovaries were composed almost entirely of this first proliferation; it tends to become like luteal tissue in some of the cases. The cords of the second proliferation appeared to have no effect on the oestrous cycle.

A. J. KOBAK.

Diathermy: Its Scope in Medical Practice. Franz Nagelschmidt. Dr. Med. Wisconsin Med. Journal, February, 1927.

The great modern development of physics, chemistry and technical industry, has offered a tremendous variety of new and untried agencies of possible value in medicine. Medical science has been reluctant to study the application of various physical agents to the treatment of disease, and this reluctance is in danger of resulting in the development of all sorts of quackery in this field. It is wrong for scientific men to ignore the possibilities of development in this line and it is time for careful and critical study of the exact effects of certain physical agencies on living tissues. In the development of physiotherapy, it is important that the specialist in this field be, in the first place, an exceilent practitioner, and in addition, he must be an expert physicist and mechanic. It is important that training courses in physiotherapy be carefully organized. Any tendency for physiotherapy to degenerate into a testimonial affair must be discouraged. It is also important to emphasize the fact that physiotherapy is not a panacea; it has certain distinct uses, certain contraindications, and certain severe limitations.

Examples of physiotherapy of more or less well established types are the use of radium and x rays in malignancy. There has lately developed the use of alpha rays for the treatment of certain skin diseases. The development of ultra violet therapy has become of great popular interest and is in danger of being abused. A certain sense of responsibility is felt in regard to ultra violet therapy, and any efforts to promote its employment as a general panacea are to be severely condemned. It is remarkable that such a small part of the spectrum, viz., that measuring about 3,000 Angstrom units, is the portion of such great value. It has been shown to have a remarkable effect on calcium fixation, upon certain vitamines, and upon the vegetative nervous system. Its application to the skin results, if properly employed, in the stimulation of all the protective agencies elaborated by that great organ. Ultra violet light does not penetrate deeply into the tissues and, as is well known, if too intense, may produce the death of the surface cells. The subsequent absorption of the products of decomposition from these dead surface cells may result in effects similar to those following the injection of a foreign protein. The infra red rays at the opposite end of the spectrum penetrate more deeply than the ultra violet rays, but peculiarly enough, not as deeply as yellow rays.

Of great current interest is the matter of diathermy which may be defined as the application of high frequency currents for the purpose of inducing internal heat. This is an entirely different proposition from the external application of heat to the surface of the body. When ordinary low frequency or direct currents are applied to living tissue, there is an ionization in the tissue with a tendency to set up a flow of the ions toward the poles. This tendency is very slow. In the low frequency alternating current, the change in the direction of the flow may be sufficient to disrupt the cell, causing pain, discomfort, and all the other sensations following the ordinary application of an electrical current to the body. If the frequency of the alternating current is raised, the movement of the ions becames progressively inhibited and, at about 10,000 alternations per second, is stopped. High frequency currents employ between 100,000 and 5,000,000 per second. This type of current was first applied to living tissue by D'Arsonval in 1901. After witnessing these preliminary trials, experiments were conducted on frogs with high frequency currents. With the electrodes applied to one arm and one leg, it was found that the skin gradually dried and that the muscular tissue between the electrodes became coagulated and cooked, but peculiarly enough, on removing the electrodes, the frogs were still able to move and apparently could continue to live indefinitely. Further experimental studies indicated that the tissues of the body, exactly as the filaments in a lamp, offer resistance to the passage of the high frequency current, and that heat develops. There is no sensation of pain, there is no muscular contraction, but merely the gradual developmet of a diffused heat between the points at which the electrodes are applied. The direction of the high frequency current is determined by the position of the electrodes. There are no chemical changes in the tissue nor any untoward reactions unless the current is extreme in intensity and duration. There is usually a hyperemia in the tissue between the electrodes, which is of an arterial origin.

In practice a large indifferent electrode is usually applied to the back or abdomen and a smaller electrode is employed for concentrating the current and to secure proper direction. If this small electrode is edged and pointed in a manner similar to a knife, it may actually be used as a knife—" the radio knife" of newspaper reports. This knife acts by immediately coagulating and cooking the tissues with which it comes in contact.

The clinical applications of diathermy are very great. In the first place, by employing diathermic surgery, a bloodless operation may be made which is exceedingly valuable in removing carcinomatous tissue. It possesses a great advantage in inducing no hemorrhage, no pain, and in requiring no suturing. It also is advantageous because no blood vessels or lymph-channels are opened and there is thus no danger of inducing metastasis. The carcinomatous area is cooked, and surrounding this coagulated area is an area of hyperemia and increased metabolism which promotes healing and favors elimination. Clinical results with this technique have been very striking. Another important use of diathermy is in the treatment of lupus. Another interesting employment of diathermy is in connection with gonorrheal infectons of the urethral tract. The gonococcus is apparently killed by a temperature slightly above the normal tissue temperatures, and sometimes very difficultly handled chronic infections of this type may be easily cleared up. The indications for diathermy are by no means the same as those for the external application of heat. Diathermy is contraindicated in internal congestion because its general effect is to produce an internal aseptic fever.

In conclusion, it is desired again to emphasize the proposition that the effects of physical agencies upon living tissue deserve careful study in medical circles. It is important that the limitations and dangers of the various forms of physical agencies employed in the treatment of disease be thoroughly understod. It is also important that no one assume to employ these agencies who does not thoroughly know these dangers and limitations. The employment of ultra violet light and diathermy has become increasingly significant within the last few years. Careful experimental work is necessary to elucidate all the factors involved in their clinical employment.

Uultra Violet Rays in Asthma. P. Duhem, M. D., Paris Med., Feb. 20th, 1926.

P. Duhem, M. D., reports the treatment of 33 cases of infantile asthma with ultra violet rays during the last year and a half. Complete cure resulted in 17 cases which had previously appeared to be hopeless, 6 were markedly improved, 4 were definitely benefited, in 4 cases no change was produced, and in 2 cases the treatment had to be terminated prematurely owing to return symptoms. Duhem considers that the treatment should not be prolonged or intensive and that intervals without treatment should be interspersed. He starts with an exposure of two minutes, the quartz lamp being placed at a distance of 60 cm and increases the subsequent exposures by two minutes up to a final total of six minutes. The lamp is brought nearer by 5 cm. at each exposure until a distance of 45 cm. is reached. Duhem draws attention to the production of ozone by the quartz lamp with irritant effects on the bronchi and the lungs. He therefore emphasizes the need of caution in treating asthma in this way.

Interpretation of the Roentgenogram from the Standpoint of the Stomatologist. Jos. D. Post, M. D. The Review of Clinical Stomatology, Sept. 1926.

"The roentgenological study of the teeth and alveolar process plays a most important part in the subject of focal infection, since so large a percentage of these foci have their origin in the stomatological region. The tooth showing an ill defined, cloudy area about the root apex is far more to be suspected than one showing a large walled off area of periapical pathology which appears as a darker area. Areas of condensing osteitis as a sequel of periapical disease should not be looked upon as healed processes. The reason is asked why it is so difficult to convince the average dentist of pathological changes shown on the roentgenogram? Is it not because, up to the present time, that their training has been sadly neglected in general pathology, and the fact that stomatological structures should be considered as a part of the general physical make-up? The roentgenological examination and its findings should be considered as but a link in the diagnostic group study of patients.

"In summarizing, the following points are emphasized: (1) The careful investigation for the various forms of residual pathology; (2) recognition of the early changes in periapical pathology; (3) reserving the making and interpretation of the roentgenograms to a consultant devoting his entire time to the study of that specialty; (4), close co-operation between the medical and dental clinician and the roentgenologist."

Primary Chondroma of the Lung, a Roentgenological and Pathological Study Based upon an Analysis of Forty Cases, with a Report of Two New Cases. Preston M. Hickey and Walter M. Simpson. Acta Radiologica, Vol. V FASC. 6, 15: XII, 1926, No. 28.

As the border line of advancement in the field of lung surgery goes steadily forward, the demand upon the roentgenologist for the accurate differentiation of various lung lesions becomes more urgent. It is with this fact in mind that the writers have undertaken to report two cases of pulmonary chondroma and to analyze the data obtained from previously reported cases, in an endeavor to establish certain pertinent diagnostic criteria which might prove of value in identifying these tumors intra vitam. This subject should be of par-

ticular interest to the roentgenologist because the shadows produced by these tumors have never yet been correctly interpreted, if one is to judge from the information gleaned from the available literature on the subject.

It is of more than passing significance to note that the greatest interest in pulmonary chondromata was manifested in the middle half of last century, when cellular pathology was coming into its own, and when new and added emphasis was being placed upon anatomical diagnoses. This period was followed by a quarter of a century during which interest in lung chondromata appears to have waned, certainly not because of decreased incidence, but probably because of the feeling that such growths were invariably accidental discoveries at the necropsy table, and, hence, quite devoid of clinical interest. To prove that such a belief is unjustified in the light of our present-day knowledge is one of the purposes of this paper. In the past few years, thanks to progress in the field of roentgenology, interest in these tumors has been revived.

A study of the available literature discloses but 38 previous reports of human cases, and of these but 7 have been written in English. But one important contribution appears in American medical literature—that of McGlumphy (27), who reports four cases.

Most pathological textbooks dismiss the matter with a single statement as to the rarity of such tumors. The fact that over one-half of the cases have been reported since 1900 would tend to indicate that these tumors are much more common than is generally believed. Many instances have been reported of the occurrence of primary chondromas in the lungs of lower animals. Kitt described a large nodular chondro-adenoma which projected from the right main bronchus in the lung of a horse. Peach (41) told of an encapsulated, nodulated enchondromatous tumor 2½x3 inches in the lung of an ass. Gurlt, Foerster, Bruckmuller, Peuch, and Willick have described pulmonary chondromas in cattle, while Nocard and Cadeac have reported similar tumors in dogs (42). Two cases have been encountered in the Pathological Laboratory of the University of Michigan Hospital within the past five years.

THE AUTHOR'S SUMMARY

1. The results of a roentgenological and pathological study, based upon a report of two cases of primary pulmonary chondroma and an analysis of data obtained from previous reports of 38 similar cases, are presented.

2. Primary lung chondromata undoubtedly occur with greater frequency than a review of the literature would indicate.

3. Progress in roentgenology has stimulated interest in these tumors.

4. No case has ever been properly interpreted roentgenographically.

5. Macroscopically, the tumors usually appear to be made up of multiple islands of cartilage, separated by vascular connective tissue and adipose tissue. Calcification or ossification of the cartilage occurs in most instances. The tumors are almost invariably surrounded by normal lung tissue.

6. Two gross characteristics of these tumors which possess differential diagnostic importance are the invariable podular, lobulated periphery and the patchy, haphazard calcification or ossification.

7. Microscopically, in addition to the calcified or ossified cartilage, connective tissue and fat tissue, one usually finds complex glandular structures in the septa between the cartilage units, lined by cuboidal or columnar epithelium. Smooth muscle has been described in a few cases.

8. The majority of the tumors were located just beneath the pleura. In but six of the forty cases was there any close association with the bronchi.

9. These complex tumors probably have their origin in displaced bronchial anlagen, since all of the histological elements found in them are normal components of the bronchi.

10. The few cases which have been studied roentgenologically have been diagnosed echinococcus cyst. The lobular, nodular periphery and haphazard calcification or ossification of the pulmonary chondromas, together with an absence of clinical manifestations of taenia echinococcus infestation, should serve to distinguish these tumors.

11. The practical importance of such differentiation is at once evident when one considers the great difference in the treatment of the two diseases.

Radiometric Measurements on the Carbon Arc and Other Sources Used in Phototherapy. W. W. Coblentz, Ph. D., M. J. Dorcas and C. W. Hughes. J. A. M. A., Vol. 88, No. 6, Feb. 5, 1927.

These investigators present their research which was carried out in co-operation with the Research Laboratory of the National Carbon Company, which provided extensive lamp equipment and a part of the personnel.

The object in the present paper is to present data on the spectral energy distribution of the carbon arc under various conditions of operation. Comparative data are presented also of the spectral energy distribution of the sun, of a 1,500 watt gas-filled tungsten lamp, the quartz mercury arc; also of the radiation emitted by the arc between rods of nickel and of tungsten.

Data on the carbon arc were obtained by two methods: (1) spectral energy curves in the ultra violet and in the visible spectrum by means of a quartz spectroradiometer, and (2) spectral radiation components in seven steps throughout the whole spectrum, by means of transmission screens.

A study was made of various cored carbons, such as white flame, red flame, yellow flame, neutral core and nickel core, to learn the effect of the core on the spectral energy distribution.

The effect of varying the electric current, also the effect of using direct current and alternating current, was investigated, and it was found that in some parts of the ultra violet spectrum the emission bands are more intense on direct than on alternating current. Similarly, the intensity of the cyanogen band at 389 millimicrons is affected by the presence of metals in the core.

The effect of combinations of metal core and neutral core carbons was studied. Data were collected also on high intensity arcs using currents up to 125 amperes. The general effect is to increase the emission of ultra violet radiation of very short wave lengths.

Radiation of wave lengths greater than to 1400 millimicrons cannot penetrate deeply into the body tissue.

Some Types of Neuritic Reflex Pains Not Generally Recognized. William Martin, M. D. Medical Journal and Record, Dec. 15, 1927.

The type of pains under discussion here are not generally recognized, since they occur at times where one would least expect them to. The pain which is the result of a neuritic involvement of the cervical and brachial plexes may be considered to be of great importance from the viewpoint of intensity and seeming gravity. Neuritis is an inflammation due to several possible causes, the chief being a local or systemic infection and trauma of different kinds—a focal infection is the chief factor in the average case. There are cases which have all the earmarks of a neuritis from the viewpoint of pain, yet are not true cases. These are termed perineuritis, wherein the inflammation is limited to the perineural tisues. The true neuritis is of two main types, interstitial and parenchymatous. Each may have the usual acute, subacute and chronic stages. These are more frequently the result of a systemic infection or disease, such as diabetes, malaria, alcoholism and lead poisoning. The pain of a brachial neuritis may affect the cervical nerves as well and the pain reference may be to distal points of either or both distribution. One type involving the occiput has for one of its features a dull occipital headache. The point of pain is located at one side of the cervical spine and is very sensitive to pressure. There may be with this a wry neck, when this is present the involvement is more severe and of longer standing. Unless one thinks of the nerve distribution here, the tendency will be to consider it to be a myositis and treat it by using the drugs generally given for headache. If the other thought is in mind the static wave current will be used to test out the trouble—this will be readily found if the current is applied to the brachial plexus. For the occipital pain, testing with a metal electrode is not so satisfactory. The author uses the non-vacuum surface tube, the smaller the better. Treatment is with the same current applied in the usual manner to the surface of the plexus, and the tube to the occiput, attached to the positive pole, just as is the metal electrode. In many cases one treatment will take care of the occipital part and the headache will disappear. Another unsuspected type of referred pain from the plexus is that affecting the index finger of the mechanic. Local treatment of the finger will bring no satisfactory response. Testing the brachial plexus with the static wave current will demostrate where its origin is. Indirect sparks are advisable in the treatment, as in this way the finger can receive its full share of the current. The third type of involvement of this plexus is that in which the precordium is affected, simulating angina pectoris—it offers a diagnostic difficulty and suggests a grave involvement, therefore being the one type of referred pain which must receive particular attention. With the suspicion of a neuritic involvement in mind, when the static wave current test is made, with the painful response, there is a fair evidence of a neuritic condition. If it is a pure neuritis, treatments for this condition will bring the response, but if a true angina, this will not be the case. In such cases where there is myocardial insufficiency, heart diathermy must be added for muscle nutrition. Usually after a few treatments by the use of the wave current and sparks the pain has largely decreased.

The sciatic reflexes are painful, but not of a grave nature. The one often unsuspected condition is painful knee joint, which is generally looked upon as arthritic in character; even without demonstrable pathology, this diagnosis has been made by competent men. A case of the type under discussion is cited by the writer, which proves that these cases do not need more than sciatic treatment, unless there is some local tenderness, under the testing. Leg cramp involving the calf muscles is another type of reflex pain. These are always sciatic in origin. Hot applications will sometimes give relief. All of Martin's cases have responded to treatment with the static wave current and sparks.

The Use of Radium in Internal Medicine. E. V. Allen, M. D., H. H. Bowing, M. D., L. L. Rowntree, M. D. Journal American Med. Association, Vol. 88, No. 3, Jan. 15, 1927.

The authors' experience in the use of radium in the diseases for which it has been particularly advocated leads them to the opinion that its field of usefulness is very small.

The intravenous use of radium chloride in doses of from 10 to 50 micrograms has not been attended by toxic manifestations.

In 22 cases of carefully controlled hypertension, treatment by radium chloride intravenously did not yield sufficiently favorable results to encourage its further use. Following the injection, a transient fall of pressure was observed similar to that following the use of sodium nitrite or phenobarbital. In two cases there was a slight response, which persisted during the period of observation.

Radium chloride was used intravenously to relieve pain 39 times in 28 cases. The response of the pain of thrombo-angiitis obliterans, and to a less extent of diabetic neuritis, was gratifying. In a miscellaneous group consisting of endarteritis obliterans, neuritis, arthritis and pruritus vulvae, the relief was not sufficient to warrant further usage. The best results were obtained in the relief from pain in the thrombo-angiitis obliterans, but even in this condition radium therapy has been replaced by treatment with non-specific vaccines, which yield even greater relief.

While qualitatively radium may relieve pain and reduce blood pressure, the results quantitatively usually fall far short of success.

Some Aspects of the Biological Action of Light. Franz Nagelschmidt, Dr. Med. Medical Journal and Record, Dec. 15, 1926.

If we speak of light simply as the sun or the carbon arc lamp, the designation is very inexact. These sources of light contain besides visible light, other invisible, infra red heat radiations and invisible ultra violet rays of different wave lengths. If we speak of ultra violet light, we are using ultra violet rays of widely varying biological efficiency, beside visible light and some heat radiation. The psychic effect of light is evident; the different colors act differently. The reds and yellows have a vivifying and exciting psychological action, while the violet end of the spectrum acts in a soothing and sedative manner. The distribution of energy in the spectrum is greatly dependent upon the temperature; if for instance, a carbon arc lamp is burning with a certain amount of current, the carbon gases in the light arc show a temperature to which certain intensities of radiation in the spectrum correspond. Conditions are similar in the sunlight.

Visible light is differently absorbed by normal serum and pathological serum and the same is true for ultra violet rays. An example for visible light is in the growth of mice tumors. The wave lengths of 7,200, 6,500, 5,500 and 5,000 A increase the growing of sarcoma; but 6500 A, which increases sarcoma, decreases carcinoma. It may be that absorption bands of the pigment play here an active role. If you expose a series of mice, with tendency to spontaneous tumors, to sunlight, the percentage of mice tumors will increase; in the dark it will decrease. For bacteriological examinations the strongest bactericide is shown by the wave length 3,000 A. This action belongs to a very narrow zone while other spectral parts have an action which is three to four thousand times less. If we expose the skin of the arm to sunlight a slight erythema is produced if the dose is sufficient; but a place protected by a piece of glass will remain free of erythema. This experiment has been made by Finsen. Our clinical and experimental researches have provided us with a great number of single facts concerning light biology, so that in practical medicine we are able to secure a good many therapeutical results with sufficient certainty. We know that we can cure rickets in children as well as the experimental in rats, with ultra violet light. It has been proved that black rats require much larger light doses to show the antirachitic effect than albino rats. In men, too, we shall have to measure the light doses, depending on the pigmentation of the skin. We can heal natural or experimental rickets by administering vitamines, so we may suppose that the curative action of sunlight in animals and men is analogous, i. e., it produces vitamines. We can just as well influence the blood level of calcium and phosphate and control troubles in the production of bone substance in children. Cholesterol is influenced in the skin, the blood, and in internal organs, for example, the liver; many other actions are produced, for instance, the relation of albumin to globulin in the serum and the degree of sugar tolerance are influenced. The biological action of a light bath cannot be explained in a simple way. All the changes which the author has mentioned are produced by an energy which is absorbed, at least partially, in the most superficial layers of the skin and do not even reach the superficial capillary layer. We can only explain this action by supposing a direct or indirect irritation of the sympathetic nervous system and by so changing the balance of the sympathetic and parasympathetic nervous systems as to influence the internal secretions. We know that these mechanisms are very complicated, even in response to much simpler and more definite irritations occurring in experimental investigations; much depends not only on the individual but on the momentary disposition of the individual in regard to the response of the different functions to one and the same irritation. In conclusion the writer states, that we are not yet in possession of radiating apparatus producing one narrow space of spectrum just needed for a certain purpose, and that the measuring methods are still far from perfect.

Heliotherapy in Relation to the Treatment of Tuberculosis of the Spine in Children. R. H. Ghormley, M. D. The Journal of the American Med. Association, Vol. 88, No. 5, Jan. 29, 1927.

This paper is based on the observation of 63 cases of tuberculosis of the spine at the New England Peabody Home for Crippled Children in Newton Center, Mass. This institution was founded in 1894 and was long under the direction of the late Dr. Robert W. Lovett, who there began the use of heliotherpy and the outdoor treatment of bone and joint tuberculosis.

Of the 63 patients, all but four had the onset of the disease before the age of six years, and in 43 of the remaining 59 cases the disease began before 3 years of age. The technic of heliotherapy has been quoted so often that it is now well known. Slight variations may occur, but the general scheme is similar everywhere. While tuberculosis of the spine is rarely proved such in the true sense of the word, the diagnosis is usually correct when careful examination is made. The method of treatment outlined is particularly applicable in children, the most important guides being the spine tracings, weight charts and the roentgenograms. Success in improving deformity depends on the localization and particularly the extent and duration of the disease; early diagnosis followed by adequate treatment under constant observation will result in healing with slight, if any, deformity. Though the advantages of heliotherapy are well known, the calcification in the lesion and in the abscesses is an important change and the altered reaction of the tissues through allergy may be better sustained under heliotherapy and thus healing favored.

Irradiated Milk: Effect on Blood. V. Dawkins, M. D., and C. L. Pattison, M. D. The Lancet, Dec. 25, 1926. (Abst. J. A. M. A., Feb. 26, 1927.)

The observations made by Dawkins and Pattison are in favor of greater food value of irradiated milk over non-irradiated milk. These observations were made on five children who had been in the hospital with active bone tuberculosis for an average period of four months, without marked improvement in either general condition or local lesion. During this period they had been given the ordinary hospital diet, which included cod liver oil and 1¼ pints of milk daily. Then half a pint of the 1¼ pints of the milk in the diet of these patients was exposed daily to the rays from a quartz mercury vapor lamp at a distance of about two feet for half an hour. The milk was contained in shallow trays and stirred frequently. The remaining constituents of the diet were as usual. After four weeks, the red cells and hemoglobin were found to have increased in all the patients. A further increase in the red cells was again noticed at the end of another four weeks, but the hemoglobin varied. The milk was then given without irradiation for another four weeks. A fall in the erythrocytes was found to have occurred in every case, and a reduction of the hemoglobin had taken place in four out of five of the cases. The same amount of milk (irradiated) as before (one-half pint) was then given daily, and at the end of three weeks the red cells had in every case increased; the hemoglobin, however, had only slightly altered; in one case its percentage was increased, in two cases it was unaltered, and in the remaining two decreased.

Effect of Ultra Violet Irradiations in Some General Diseases Influencing the Ear, Nose and Throat. A. R. Hollender, M. D., and M. H. Cottle, M. D. The Chicago Med. Recorder, Feb., 1927.

Systemic factors in relation to pathological changes in the upper respiratory tract are well recognized in a general sense though specific causation is often merely conjecture. The influence of general diseases on the middle ear and labyrinth, on the nose and on the pharynx as are typified by syphilitic and tuberculous lesions, by the exanthemata, by endocrine dysfunctions, by vitamin deficiencies, etc., are illustrative of the possibilities in this connection. To this is added the "depressed state" following operation on the ear, nose or throat.

It is not intended to convey the impression that ultra violet irradiations are of value in all the general diseases discussed. There is, however, convincing evidence of the uniformly successful results which have been obtained in several special conditions such as tuberculous laryngitis, lupus, perennial hay fever and "post-operative depression."

The effects of general light therapy are discussed. In this part are considered quotations from the writings of Jesoniek and Rothman, the latter of whom has advanced the thought that the action of light is transmitted to the interior of the body through the agency of the involuntary nervous system and that light baths, both natural and artificial, bring about a condition corresponding to sympathetic depression. Other effects are also considered.

Ultra Violet Radiation in Celiac Disease. R. G. Michelmore, M. D. Lancet, Dec. 18, 1926. (Abst. J. A. M. A., Feb. 26, 1927.)

In Michelmore's experience, ultra violet ray irradiation has proved beneficial in a case of celiac disease, by improving the calcium metabolism in some way and rendering the fats more readily assimilable as soap by the lacteals. The rays develop a vitamin that renders the fat susceptble of absorption.

Standardization of Ultra Violet Radiation. J. E. Moss and A. W. Knapp. B. J. of Actinotherapy, January, 1927.

A chemical method for the standardization of ultra violet light is described in detail. It is known as the Uroxameter method, the name being apparently coined from two of the substances forming the chemical solution acted upon by the rays. This solution consists of 20 c.cm. of a 2 per cent solution of oxalic acid, 5 c.cm. of a 1 per cent solution of uranium acetate, and 20 c.cm. of distilled water. It is put in a circular flat-bottomed vessel which is 10 cm. in diameter, and has vertical glass walls, 8 cm. high, and these walls are painted on the outside with one coat of red paint and three coats of white, so that the interior of the vessel appears red and the passage of light thrugh the sides is prevented, while the white paint serves to reflect heat from the outside. On top of the cell can be fixed a gas-tight lid of fused transparent silica. The vessel containing the solution is placed 6½ inches below the center of the lamp to be tested, and is rotated by means of a table at 5-6 revolutions per minute. Part of the test solution is titrated with a decinormal solution of potassium permanganate, in order to find the amount of oxalic acid which it contains. Of the remainder, 45 c.cm. is then exposed to the light for 30 minutes and afterwards again titrated. The percentage of oxalic acid which has been decomposed can then be ascertained, and this is proportional to the amount of radiation absorbed. A large number of estimations have been made by this method to determine such diverse values as the variation in radiating power of mercury lamps the color-destroying power of the radiations, and the transparency of various glasses. From spectrometer determinations it is clear that this solution strongly absorbs radiations shorter than 3200 Angstrom units, and is therefore an appropriate medium where effects are due to rays in this region of the spectrum. The tests suggest that the method can be relied on for quantitative purposes, and we can well imagine that it would probably prove economical and suitable for industrial work. It is not one, however, which is likely to be adaptable to medical requirements. Here, as in the field of x rays, the first essential of any device for measurement, either of the intensity or of the total dose of radiation, is that it should be easy to use it at the same time as when the rays are actually being employed in treatment.

Standardized Technique in Radiography of Cases of Pulmonary Tuberculosis. Percy G. Sutton, M. S. R. The Brit. J. of Tuberculosis, July 1926.

The suggested technique for producing a chest radiograph is summarized by the author as follows:

Fourteen by seventeen inch film between two intensifying screens. Distance of tube from film 39 inches. Center the tube over a selected point. Adjust the voltage until the kilovoltmeter shows a reading 45 kilovolts. Advance the heating current rheostat until the milliamperemeter shows a current of 40 milliamperes passing through the tube. Set the automatic time switch for a half to one second as required. Close the transformer switch and make the exposure. Develop for five minutes at 65° F. Fix in acid fixing bath.

The foregoing remarks are not to be taken as a hard and fast rule, as conditions will vary according to the apparatus employed, but it is hoped that they may be of some use in aiding practitioners to develop a standardized technique in radiography of the chest.

Tuberculosis Work in Glasgow. A. S. M. Macgregor, M. D., D. P. H. The Brit. J. of Tuberculosis, Oct. 1926.

The following is a brief account of the development and scope of the Glasgow Tuberculosis Scheme. It gives a broad view of the activities of the corporation, and explains the principles on which the scheme is based.

The policy of the corporation has been in great measure determined by the housing conditions of the population. Apart from the question of sanatorium treatment for early cases, the corporation has been influenced by two considerations. In the first place, owing to the relatively large proportion of small houses in the city, the provision of institutional accommodation for pulmonary tuberculosis has to be made on a correspondingly ample scale. For this reason, one of the features of the scheme has been an extensive provision of hospital beds for the more advanced cases who are unsuitably housed. In the second place, there has been recognized the necessity for making ample provision for the appropriate treatment of the non-pulmonary or surgical forms of tuberculosis, for the treatment of which there are at present some 450 beds. This provision is being further extended with the object of ensuring that all cases discovered in the early stages of the disease will receive proper and suitable institutional treatment.

Of this total some 200 beds may be regarded strictly as sanatorium accommodation for early cases, while 450 are devoted to the treatment of the non-pulmonary or surgical forms of the disease. The remaining beds are occupied mainly by the more advanced types. On reading the data illustrative of housing conditions, along with the institutional provision, the reason for the relatively large amount of accommodation provided for advanced cases will be obvious. This policy is based on both preventive and humanitarian considerations.

The above mentioned 450 beds for non-pulmonary tuberculosis have been provided at Robroyston Hos-

pital. The utlity of an institution of this kind depends upon its capacity to receive patients promptly as they are recognzed in order to avoid complications, such as crippling and deformity, which are liable to ensue, especially where patients have had periods of antecedent treatment of a temporary or unsuitable character, and present themselves with abscesses which have been opened, and with sinuses which have become septic. For these reasons it was decided to make a further provision of 330 beds at Mearnskirk Hospital and Sanatorium, an institution which is now in course of erecton on modern and up-to-date lines on the uplands to the south of Glasgow, some eight miles from the city. When this institution has been completed. the total provision for the non-pulmonary forms of tuberculosis will reach 750 beds, or one bed per 1,300 of the population, which shou'd be sufficient for this type of case.

These, then, are the general principles on which the Glasgow scheme has proceeded. In addition to this, the city has five tuberculosis dispensaries, with a staff of five clinical medical officers and twenty-one health visitors. There is an observation ward with 34 beds at Ruchill Hospital, with an associated x ray department, at which full advantage is taken for diagnostic purposes, both for the hospital itself and for the outdoor dispensaries.

Facilities for treatment by ultra violet rays have also been provided in association with one of these clinics, while provision has been made at Robroyston Hospital for this form of treatment. The results have been excellent, especially in the treatment of lupus and for bone and joint tuberculosis.

The death rate from pulmonary tuberculosis in Glasgow in 1925 was the lowest recorded, being 0.9 per 1,000 of the population. This rate has continuously declined since 1870. when it was almost 4 per 1,000 persons. The death rate from non-pulmonary tuberculosis has suffered a similar reduction, especially rapid since the beginning of the century.

For comparative purposes the following table shows the rate of decline in the phthisis death rate per 100,000 persons in Glasgow, as compared with certain other large towns in Scotland and England.

A Review on the Use of Diathermy in the Treatment of Pelvic Inflammatory Conditions in Women. R. Lance Impey, M. C., M. D., F. R. C. S. (Ed.), South African Medical Record, Sept. 1926.

The type of case that responds most readily to diathermy treatment is gonorrhea. The older treatment is condemned as it is now claimed that diathermy is a valuable aid, and is likely to procure success when other methods have failed.

It is a well-recognized fact that a rise of temperature even of a few degrees, is prejudicial to the existence of the gonococcus in living tissue. By means of diathermy a sufficiently high degree of local pyrexia can be produced which diminishes the vitality of the gonococci, even if it does not destroy them, without harming the part in which it is growing. The heatng of the tissues is followed by a polymorpho-leucocytosis which increases their power to exterminate the organisms.

The technique employed is practically that recommended by the pioneers in this form of treatment, Cumberbatch and Robinson, with this exception: that, in addition to using diathermy, a systematic treatment of the affected parts is carried out, with one or other of the usual applications used for this purpose, such as silver nitrate, mercurochrome, picric acid, etc. The reason for this additional treatment is to attack those organisms that have survived the effects of heat at a time when their vitality is much lowered. In all cases in which diathermy is being used both the urethra and cervix should be treated. In the treatment of the urethra a copper electrode, containing a thermometer, is passed into the canal for 1½ inches. This is held in position by an insulated stand placed alongside the patient's thighs. A directing electrode. consisting of a long band of sheet lead 3 inches wide, is fixed round the hips. Having attached the cables for the diathermy apparatus to the insulated stand, and the directing electrode, the current is turned on, and gradually increased until the patient complains of slight pain—the thermometer usually registering at this time 112° to 115° F. The current is then slightly reduced and kept at this strength for ten minutes.

A speculum is next introduced into the vagina, and a cervical electrode, also containing a thermometer, is inserted into the cervical canal for ¾ inch. As the cervix is insensitive to heat, it is essential that a close watch should be kept on the thermometer, and the temperature not raised above 115° F. The same directing electrode is used as for the urethra, and the current is kept on for ten minutes.

If there is evidence of salpingitis, a vaginal electrode is introduced, and the current, being worked up to 1½ to 2 amperes, is maintained for twenty minutes. If proctitis be present, or if the patient be a virgin, a rectal instead of a vaginal electrode is used.

Each treatment with diathermy is followed by the local application of some preparation, such as 10 per cent protargol in glycerin, to all parts that may be infected.

Treatment on these lines is carried out two or three times a week, until all clinical and bacteriological signs of the disease are absent on repeated examinations.

There is a common belief that when once infected, a woman never gets rid of gonococcal infection. This

is not correct, as when thoroughly treated, women should make a complete recovery, without any after-effects.

Two cases are reported in detail. In the author's experience cases of infection of the female pelvis—no matter what the origin may be—respond more readily to treatment by diathermy than to other methods.

The application of heat, either to the lower abdomen, or by means of hot douches is a form of treatment for pelvic inflammatory conditions that has proved of much use. The great drawback has been, however, that so much of the heat is conducted along the skin, and so little gets to the affected parts, whereas by means of a diathermy current we are now able to heat "through and through" the deeper tissues, and get the full advantage of heat to these parts.

The Biological and Clinical Significance of Heliotherapy in Dentistry. Dr. Josef Kieffer. American Dental Surgeon, Dec. 1926 and Jan. 1927.

The subject is surveyed at great length and many interesting and valuable suggestions given. Some references are made to technic and these are of importance particularly to the dental surgeon.

The author's conclusions are deduced from his studies in heliotherapy as applied to dentistry and must be regarded in this connection only.

"Irradiation with long-waved thermis rays has given such good results in our special field and in all other branches of medicine as were not attainable by our past methods."

"Irradiation must not be looked upon as a cure that can be applied indiscriminately. There remains much to be studied as to its nature and therapeutic action. The fact that it has been found useful in very painful conditions and also in chronic swellings and that we have been able to cure conditions for which our past methods offered little hope of cure is proof that we are dealing with a scientifically sound, therapeutic agent that will not be likely to be discarded."

"Today every physician knows that not all conditions can be influenced by drugs and that physics (electricity, massage, heliotherapy, etc.) prove beneficial in many cases that resist drug treatment. We are justified, therefore, in looking upon this new method, whose action is in accord with the laws of physics, as a decided step forward in our therapeutics."

The Static Modalities in Gynecology. Mary L. H. Arnold Snow, M. D. Med. J. and Rec., Dec. 15, 1926.

The status of static electricity in gynecology as an electrotherapeutic agent of value is dependent on results, be they palliative or curative, being limited in the prognosis by the cause and conditions presented.

The static modalities employed in gynecology are (1) the static wave current, (2) static sparks, (3) static brush discharge, and (4) the static induced current.

Of the many gynecological conditions, the following are amenable to treatment: amenorrhea, cervicitis, endometritis and cervical erosions, dysmenorrhea, uterine retroversions not complicated with adhesions, vaginismus, ptosis, hemorrhoids, rectal fissures, spasmodic stricture of the anus, subinvolution, renal incontinence and coccycodynia.

Each one of these conditions is briefly discussed by the author and finally the facts are summarized:

(1) The static current favorably affects stasis when the inflammation is non-infectious in character.

(2) Stasis with active or passive congestion is the representative factor of most pelvic conditions.

(3) The static current for gynecological application is mainly the static wave current with a metal or a glass vacuum electrode, although static sparks, the static brush discharge and the static induced current are also of value to meet conditions as presented.

(4) Electrotherapy like surgery has a selective field in the realm of gynecology. It does not infringe, nor does it do the impossible. Only by a careful consideration of conditions presented and a selective discrimination of the modality indicated to meet requirements will palliative or curative results follow.

The Static Current in the Treatment of Inflammation. William Benham Snow, M. D., Med. J. and Rec., Dec. 15, 1926.

Snow first defines inflammation and discusses its pathology. Then the physiological effects of static modalities are cited.

The following are the conditions in which static electricity was first used: Neuritis, sciatica, Bell's palsy and coccycodynia, poliomyelitis, arthritis and rheumatoid arthritis, prostatitis, pelvic conditions, visceral congestions, exophthalmic goitre, trauma.

"The peculiar effects of the static current are derived from the fact that it is a direct or constant current of high potential and therefore possesses the characteristic qualities of the constant current in inducing direct muscular contraction of the muscle cells."

"The effects of the static current important in therapeutics are: (a) the mechanical removal of infiltration from engorged tissues where no infection is present; (b) it produces a complete relief of tense muscles when applied, thereby overcoming muscular contraction associated with the inflammatory processes; (c) with the general administration of the one pole modality, it has a remarkable effect in improving local and general metabolism."

"There is no other electrical current at present available possessing the same characteristics and capable of the same therapeutic effects as the static modalities, and

from the fact that it is so remarkable in its influence upon inflammatory conditions, it is indispensable for prompt and complete relief of these conditons."

The Uretero-Vesical Opening Demonstration of a New Fulgurating Incisor. Neil S. Moore, M. D. The Journal of Urology, Vol. XVI, No. 6.

Moore reviews the anatomy of normal ureter orifice, and also the physiology and pathology. He was prompted to invent this new fulgurating incisor by the increase in popularity of so-called closed methods of ureter surgery, especially for the removal of urctral calculi.

According to Moore, the ideal instrument for incising the ureter opening should have the fo'lowing requirements:

(1) Of proper size, shape and flexibility to allow use and manipulation through a cystoscope under local anesthesia.

(2) Complete operation at one sitting and further instrumentation into the ureter, if necessary.

(3) There should be no hemorrhage, as hemorrhage prevents further work and often seriously alarms the patient.

(4) The chance of infection should be minimal.

Cutting instruments, if ever mechanically perfect, are usually accompanied by more or less hemorrhage. The incision also invites infection. It occurred to me that a properly constructed fulgurating or electro-coagulating knife would fulfill the necessary requirements and e'iminate many of the obstac'es we have heretofore been dealing with. The result was the perfection of the following described instrument:

The incisor comprises a simple insulated flexible shaft. To the distal end is attached a small curve knife suitable for fulgurating. Beyond the knife is a tapered insu'ated point ½ to ¾ inch in length, small enough to enter most any size ureter, and which serves as a lead up the ureteral canal until the knife is pressed firmly against the opening and the anterior ureter wall. The proximal end is equipped for connection with an clectrical cable, either monopolar or bipolar current may be used. The instrument is adapted to a single operating cystoscope.